

PB84-170836

Sociological Factors in the  
Adoption of Agricultural  
Best Management Practices

Iowa State Univ., Ames

Prepared for  
Environmental Research Lab., Athens, GA

Mar 84



U.S. Department of Commerce  
National Technical Information Service  
**NTIS**

EPA-600/5-84-001  
March 1984

SOCIOLOGICAL FACTORS IN THE ADOPTION  
OF AGRICULTURAL BEST MANAGEMENT PRACTICES

by

Peter J. Nowak, Peter F. Korsching, Donald J. Wagener and Thomas J. Hoban  
Department of Anthropology and Sociology  
Iowa State University  
Ames, Iowa 50011

Cooperative Agreement No. CR806814-01

Project Officer

Thomas E. Waddell  
Technology Development and Applications Branch  
Environmental Research Laboratory  
Athens, Georgia 30613

REPRODUCED BY  
NATIONAL TECHNICAL  
INFORMATION SERVICE  
U.S. DEPARTMENT OF COMMERCE  
SPRINGFIELD, VA 22161

ENVIRONMENTAL RESEARCH LABORATORY  
OFFICE OF RESEARCH AND DEVELOPMENT  
U.S. ENVIRONMENTAL PROTECTION AGENCY  
ATHENS, GEORGIA 30613

| TECHNICAL REPORT DATA<br>(Please read Instructions on the reverse before completing)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                            |                                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|---------------------------------------------|
| 1. REPORT NO.<br>EPA-600/5-84-001                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2.                                                         | 3. RECIPIENT'S ACCESSION NO.<br>PB84-170836 |
| 4. TITLE AND SUBTITLE<br>Sociological Factors in the Adoption of Agricultural Practices                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 5. REPORT DATE<br>March 1984                               | 6. PERFORMING ORGANIZATION CODE             |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 8. PERFORMING ORGANIZATION REPORT NO.                      |                                             |
| 7. AUTHOR(S)<br>Peter J. Nowak, Peter F. Korsching, Donald J. Wagener and Thomas J. Hoban                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 10. PROGRAM ELEMENT NO.<br>CBWD1A                          |                                             |
| 9. PERFORMING ORGANIZATION NAME AND ADDRESS<br>Department of Anthropology and Sociology<br>Iowa State University<br>Ames, IA 50011                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 11. CONTRACT/GRANT NO.<br>CR806814-01                      |                                             |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 13. TYPE OF REPORT AND PERIOD COVERED<br>Final, 9/79-12/82 |                                             |
| 12. SPONSORING AGENCY NAME AND ADDRESS<br>U.S. Environmental Protection Agency--Athens GA<br>Office of Research and Development<br>Environmental Research Laboratory<br>Athens, GA 30613                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 14. SPONSORING AGENCY CODE<br>EPA/600/01                   |                                             |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 15. SUPPLEMENTARY NOTES                                    |                                             |
| 16. ABSTRACT<br>The primary goal of this research was to determine the relevant socioeconomic, demographic and agricultural factors that influence the adoption and maintenance of agricultural best management practices. A general theoretic model describing the adoption of technology was modified and used for developing hypotheses to explain BMP adoption. To test the hypotheses, data was collected on 193 farm operators in three watersheds in Iowa. The three watersheds were similar in size, topography, soil conditions, farm operation characteristics and socioeconomic characteristics of the farm operators. Four types of variables--personal and socioeconomic characteristics, land ecological characteristics, farm enterprise characteristics, and institutional factors--were examined for their effect on the adoption of BMPs. A two-stage regression analysis was used. The first stage was used to eliminate insignificant variables in each of the four types, leaving only significant variables for the final reduced equations. Results indicate that personal and socioeconomic characteristics of the farm operator are relatively unimportant in explaining BMP adoption. Farm enterprise characteristics and land ecological factors are both more important. By their nature, however, land ecological characteristics can not be affected by policy. The most important variables in explaining adoption of BMPs are the institutional factors. |                                                            |                                             |
| 17. KEY WORDS AND DOCUMENT ANALYSIS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                            |                                             |
| a. DESCRIPTORS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | b. IDENTIFIERS/OPEN ENDED TERMS                            | c. COSATI Field/Group                       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                            |                                             |
| 18. DISTRIBUTION STATEMENT<br><br>RELEASE TO PUBLIC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 19. SECURITY CLASS (This Report)<br>UNCLASSIFIED           | 21. NO. OF PAGES<br>128                     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 20. SECURITY CLASS (This page)<br>UNCLASSIFIED             | 22. PRICE                                   |

#### DISCLAIMER

Although the research described in this report has been funded wholly or in part by the United States Environmental Protection Agency through Cooperative Agreement No. CR806814-01 to Iowa State University, it has not been subject to the Agency's required peer and policy review and therefore does not necessarily reflect the views of the Agency and no official endorsement should be inferred. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.



## FOREWORD

As environmental controls become more costly to implement and the penalties of judgement errors become more severe, environmental quality management requires more efficient analytical tools based on greater knowledge of the environmental phenomena to be managed. As part of this Laboratory's research on the occurrence, movement, transformation, impact, and control of environmental contaminants, the Technology Development and Applications Branch develops management and engineering tools to help pollution control officials achieve water quality goals through watershed management.

Nonpoint sources contribute significantly to water pollution problems in many areas of the United States. Emphasis in the control of nonpoint pollution sources is on the use of Best Management Practices (BMPs), but their implementation relies on adoption and maintenance by farmers and landowners. This report examines the socioeconomic, demographic and agricultural factors that influence the use of BMPs and is intended as an aid to state and local planning agencies involved in the development and implementation of area wide water quality management programs.

William T. Donaldson  
Acting Director  
Environmental Research Laboratory  
Athens, Georgia

## ABSTRACT

The primary goal of this research was to determine the relevant socioeconomic, demographic and agricultural factors that influence the adoption and maintenance of agricultural best management practices. A general theoretic model describing the adoption of technology was modified and used for developing hypotheses to explain BMP adoption.

To test these hypotheses, data were collected on 193 farm operators in three watersheds in east-central Iowa. The three watersheds were similar in size, topography, soil conditions, farm operation characteristics and socioeconomic characteristics of the farm operators. Four types of variables--personal and socioeconomic characteristics of the farm operator, farm enterprise characteristics, land ecological characteristics and institutional factors--were examined for their effect on the adoption of BMPs. A two stage regression analysis was used. The first stage was used to eliminate insignificant variables in each of the four types, leaving only significant variables for the final reduced equations.

Results indicate that personal and socioeconomic characteristics of the farm operator are relatively unimportant in explaining BMP adoption. Farm enterprise characteristics and land ecological factors are both more important. By their nature, however, land ecological characteristics can not be affected by policy. And although farm enterprise characteristics can be affected by policy, such policies are currently neither politically nor socially acceptable. The most important variables in explaining adoption of BMPs are the institutional factors. They are also the factors that can be most easily affected by changes in policy. Implications and recommendations relate primarily to institutional support of water quality and conservation programs.

This report was submitted in fulfillment of Cooperative Agreement No. CR806814-01 by Iowa State University under the sponsorship of the U.S. Environmental Protection Agency. This report covers a period from September 1979 to December 1982, and work was completed as of December 1983.

## TABLE OF CONTENTS

| CHAPTER                                              | Page |
|------------------------------------------------------|------|
| I. INTRODUCTION . . . . .                            | 1    |
| II. METHODOLOGY . . . . .                            | 5    |
| Conceptual Model . . . . .                           | 5    |
| Research Setting . . . . .                           | 7    |
| Four Mile Creek, Tama County . . . . .               | 10   |
| Mud Creek, Benton County . . . . .                   | 12   |
| Rock Creek, Cedar County . . . . .                   | 14   |
| Methods and Data . . . . .                           | 17   |
| III. VARIABLES AND DESCRIPTIVE STATISTICS . . . . .  | 20   |
| Dependent Variables . . . . .                        | 20   |
| Average Crop Residue . . . . .                       | 20   |
| Best Management Practice Index . . . . .             | 22   |
| Independent Variables . . . . .                      | 22   |
| Personal and Socioeconomic Characteristics . . . . . | 22   |
| Awareness . . . . .                                  | 22   |
| Risk . . . . .                                       | 23   |
| Education . . . . .                                  | 25   |
| Experience . . . . .                                 | 25   |
| Stewardship . . . . .                                | 25   |
| Perceived Cause . . . . .                            | 26   |
| Farm Firm Characteristics . . . . .                  | 28   |
| Total Acres . . . . .                                | 28   |
| Tenure . . . . .                                     | 28   |
| Income . . . . .                                     | 28   |

|                                                         |    |
|---------------------------------------------------------|----|
| Farm Organization Type . . . . .                        | 30 |
| Hired Labor . . . . .                                   | 30 |
| Use of Credit . . . . .                                 | 30 |
| Land Use Intensity . . . . .                            | 32 |
| Ecological Factors . . . . .                            | 32 |
| Average Soil Erosion Rate . . . . .                     | 33 |
| Average Erosion Potential (RKLS) . . . . .              | 33 |
| Corn Suitability Factor . . . . .                       | 35 |
| Institutional Factors . . . . .                         | 35 |
| Information Behavior . . . . .                          | 35 |
| Proportion of Cost Shared Practices . . . . .           | 36 |
| Conservation Plan . . . . .                             | 36 |
| IV. RESULTS AND DISCUSSION . . . . .                    | 38 |
| Model Reduction. . . . .                                | 38 |
| Average Crop Residue . . . . .                          | 47 |
| Experimental Watershed . . . . .                        | 47 |
| Control Watersheds . . . . .                            | 48 |
| BMP Index. . . . .                                      | 50 |
| Experimental Watershed . . . . .                        | 50 |
| Control Watersheds . . . . .                            | 52 |
| V. SUMMARY AND CONCLUSIONS . . . . .                    | 53 |
| Scale of Operations and Conservation Behavior . . . . . | 55 |
| Personal Factors and Conservation Behavior . . . . .    | 56 |

|                                                          |    |
|----------------------------------------------------------|----|
| Institutional Support and Conservation Behavior. . . . . | 56 |
| Policy Implications . . . . .                            | 57 |
| REFERENCES . . . . .                                     | 59 |

#### APPENDICES

|                                                                                                     |     |
|-----------------------------------------------------------------------------------------------------|-----|
| A. Interview Schedule and Questionnaires . . . . .                                                  | 61  |
| B. Professional Papers, Publications, Theses and Dissertations<br>Resulting from Research . . . . . | 115 |

## TABLE

## LIST OF TABLES

Page

|                                                                                                                                                                                     |    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 1. Selected Comparative Statistics for the<br>Four Mile, Mud, and Rock Creek Watersheds. . . . .                                                                                    | 16 |
| 2. Summary Statistics for Dependent Variables . . . . .                                                                                                                             | 21 |
| 3. Summary Statistics for Personal and Socioeconomic<br>Characteristics -- Risk, Education and Experience. . . . .                                                                  | 24 |
| 4. Summary Statistics for Personal and Socioeconomic<br>Characteristics Having Categorical Referents --<br>Awareness, Stewardship and Perceived Cause of Soil Erosion. . . . .      | 27 |
| 5. Summary Statistics for Farm Firm Characteristics --<br>Total Acres, Tenure, Hired Labor and Land Use Intensity. . . . .                                                          | 29 |
| 6. Summary Statistics for Farm Firm Characteristics Having<br>Categorical Referents -- Income, Organization Type<br>and Use of Credit . . . . .                                     | 31 |
| 7. Summary Statistics for Land Ecological Factors . . . . .                                                                                                                         | 34 |
| 8. Summary Statistics for Institutional Factors Having<br>Categorical Referents -- Soil Conservation Plan,<br>Information Contacts and Proportion of Cost Shared Practices. . . . . | 37 |
| 9. Pearson Correlations between Independent and Dependent<br>Variables in Experimental and Control Waterbeds. . . . .                                                               | 39 |
| 10. Pearson Correlations between All Variables. . . . .                                                                                                                             | 40 |
| 11. Regression Equations for Personal and Socioeconomic Characteristics. . . . .                                                                                                    | 42 |
| 12. Regression Equations for Farm Firm Characteristics. . . . .                                                                                                                     | 43 |
| 13. Regression Equations for Land Ecological Factors. . . . .                                                                                                                       | 45 |
| 14. Regression Equations for Institutional Factors. . . . .                                                                                                                         | 46 |
| 15. Regression Equations for Reduced Models . . . . .                                                                                                                               | 49 |
| 16. Variables Affecting BMP Adoption by Experimental Design. . . . .                                                                                                                | 54 |



## LIST OF FIGURES

| Figure                                                                | Page |
|-----------------------------------------------------------------------|------|
| 1 Model of Best Management Practice Adoption . . . . .                | 6    |
| 2 Simplified Version of the Adoption Model Used in the Study. . . .   | 6    |
| 3 Location of Four Mile, Mud and Rock Creek Watersheds in Iowa . . .9 |      |
| 4 Location of Four Mile Creek Watershed in Tama County, Iowa. . . .11 |      |
| 5 Location of Mud Creek Watershed in Benton County, Iowa. . . . .13   |      |
| 6 Location of Rock Creek Watershed in Cedar County, Iowa . . . . .15  |      |

## CHAPTER I. INTRODUCTION

Nonpoint source water pollution is a serious problem in the United States. Despite its seriousness and the various forms of environmental degradation it takes, it is merely the result of an even more serious malady--the failure to implement the existing technologies necessary to prevent pollution. Best Management Practices (BMPs) are by definition those technologies that have the potential to enhance environmental quality. They provide an alternative combination of land use, conservation practices, and management techniques which, when applied as a management system to a unit of land, result in the opportunity for a reasonable economic return within acceptable environmental standards. Nevertheless, even though these BMPs have been identified and are continually being refined, there has been only marginal success in their implementation. Their potential benefit will only become real to the extent that they are actually implemented.

This report is based on research that examined the social and institutional factors that influence the adoption and maintenance of agricultural BMPs by farmers and landowners. The role of institutional factors, topographic characteristics of the land, structure of the farm organization, and personal characteristics of the farm operator will be discussed relative to their influence on behaviors which have the potential to enhance water quality and conserve the soil.

The primary goal of the research was to discover the relevant socioeconomic, demographic and agricultural factors that influence the adoption and maintenance of BMPs. This research was part of the Iowa Field Evaluation Project, a large, multidisciplinary study designed to improve the understanding of the relationships between agricultural land use practices and water quality

in streams as well as to improve evaluation of the cost effectiveness of planning, acceptance, and use of these practices (Miranowski et al., 1982; Johnson and Baker, 1982, 1983).

The results of this study should help state and local planning agencies develop and implement area wide water quality management programs. Implementation of such programs will require knowledge of the various physical, biological, economic and social systems involved. Understanding agricultural systems and their relationships to the quality of agricultural drainage water and surface water runoff increases the probability of implementing effective programs. These results will hopefully provide improved management tools for evaluating BMPs for control of agriculture sources of pollutants.

A primary consideration in instituting programs that require behavioral changes is the degree to which landowner participation and compliance can be anticipated and enhanced. The purpose of this study was to determine the social and institutional processes which influence adoption and maintenance of agricultural BMPs. This knowledge is crucial to the success of the Rural Clean Water Program and, specifically, the Iowa "208" plans.

To achieve an understanding of these processes, the principal objectives of the sociological component of the Iowa Project as outlined in the project statement were:

- I. To determine the relevant socioeconomic, demographic, and agricultural characteristics which can influence the adoption of best management practices and the acceptance of associated policies.
  - A. Measure attitudes and knowledge relative to the following factors.
    1. The proposed BMPs and overall environmental orientations.
    2. The social acceptability of various nonpoint source (NPS) pollution control policies.
    3. The agencies and organizations charged with implementing conservation practices.

4. The importance of profitability and innovation in farming practices.
  5. The perception of the potential for soil erosion and pollution problems on individual farms.
- B. Describe communication patterns in existing social networks, linkages with community organizations and agencies, and leadership structures of the farm populations.
  - C. Measure general socioeconomic and demographic characteristics of the target populations.
  - D. Measure the characteristics of farm operations such as land tenure, size, commodities produced, and agriculture technologies.
  - E. Determine the management abilities of farm operators to include measuring their knowledge of factors which allow for successful utilization of BMPs.
  - F. In cooperation with the Soil Conservation Service and the Agronomy Department of Iowa State University, develop an index of NPS pollution potential based on the soil productivity index and the universal soil loss equation. This will be applied to each farming operation to control on the importance or necessity for BMPs.
- II. Follow the adoption and diffusion of innovation process within the target populations.
    - A. Monitor the nature, extent and outcome of the contacts between the Project Practices Coordinator with farm operators.
    - B. Determine how social, economic and agricultural factors interact in the adoption of non-commercial innovations.
    - C. Determine how farm organizations, local offices of state and federal agencies, and other community voluntary associations influence the adoption process.

Work during the first year of this proposed five year project focused primarily upon sub-objectives A, B, C, and D of Objective I. Unfortunately funding for all disciplines in the project was withdrawn before the project objectives could be achieved. This meant that all but sub-objectives A, part of B, C, and D of Objective I had to be dropped. Therefore, this report will address only the descriptive correlates associated with the adoption process. Process or time-series data--which would be necessary to truly assess the

efficiency of various policy options--will have to be generated in another study.



## CHAPTER II. METHODOLOGY

### CONCEPTUAL MODEL

To examine the process of the adoption of BMPs in this research, the general model for the adoption of innovations was utilized. The adoption of innovations model has enjoyed great success in explaining why individuals adopt or reject agricultural innovations. Following Rogers and Shoemaker (1971), the general theoretical framework for the adoption of innovations was modified to predict the adoption of agricultural BMPs. This model can be used to organize the numerous factors related to the adoption of BMPs into a researchable framework. The model is shown in Figure 1.

According to the model, the adoption of BMPs is basically a recursive, temporal process in which the farmer begins with knowledge or awareness of the BMP. The next step is evaluation of the BMP in terms of how it would fit into the farmer's operation and what benefits or costs would be associated with adopting it. Based on the evaluation of the BMP, the farmer will make a decision to either adopt or reject the BMP. Additional time, knowledge and experience will either confirm or refute the initial decision, causing the farmer to continue in the existing course or to take a new course of action. As can be seen in the model, personal and socioeconomic characteristics of the farm operator, characteristics of the farming operation, the nature of the larger social system, types of communication channels and amounts of communications, and the perceived characteristics of the BMPs all affect the adoption process.

This report will examine a simplified version of the adoption model as shown in Figure 2. Awareness or knowledge of agricultural BMPs is not an issue



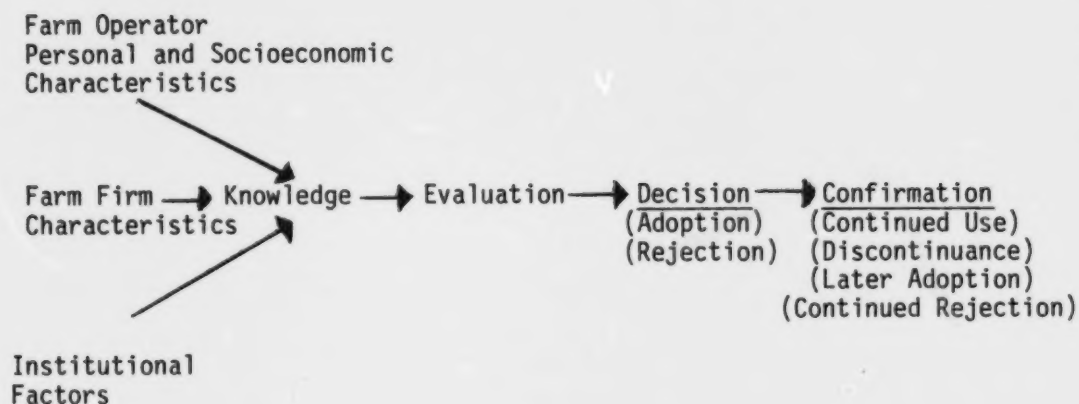


Figure 1. Model of Best Management Practice Adoption  
Source: Rogers and Shoemaker (1971).

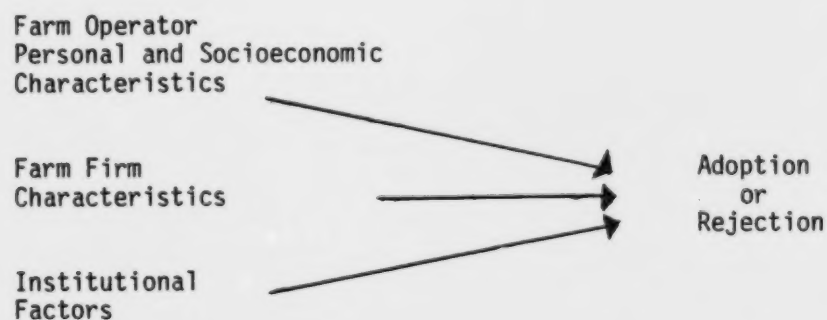


Figure 2. Simplified Version of the Adoption Model Used in the Study

that needs to be addressed by this research. Agricultural BMPs largely consist of existing technologies with which most farmers already have familiarity. The issue then is not so much one of an awareness of the technology, but rather one of awareness of the problem for which the technology is an appropriate solution (Korsching and Nowak, 1983). Furthermore, the relationship between adoption of BMPs and their perceived characteristics has already been examined in another report on analysis of data from this study (Moon, 1982). Therefore, the analysis in this report will focus specifically on the decision-making stage of the adoption process. The report will examine the effect of personal and socioeconomic characteristics of the farm operator, farm firm characteristics, land ecological characteristics and institutional factors on the adoption of agricultural BMPs.

#### RESEARCH SETTING

Three watershed areas in east-central Iowa were selected for saturation sampling. The population for the study was composed of all persons who operated land within the watersheds. The original conceptualization of the research methodology allowed for the control of various factors impinging on the adoption of BMPs. This quasi-experimental design included three geographically separated watersheds of similar size, topography, soil conditions, farm operation characteristics, and socioeconomic characteristics of farm operators.

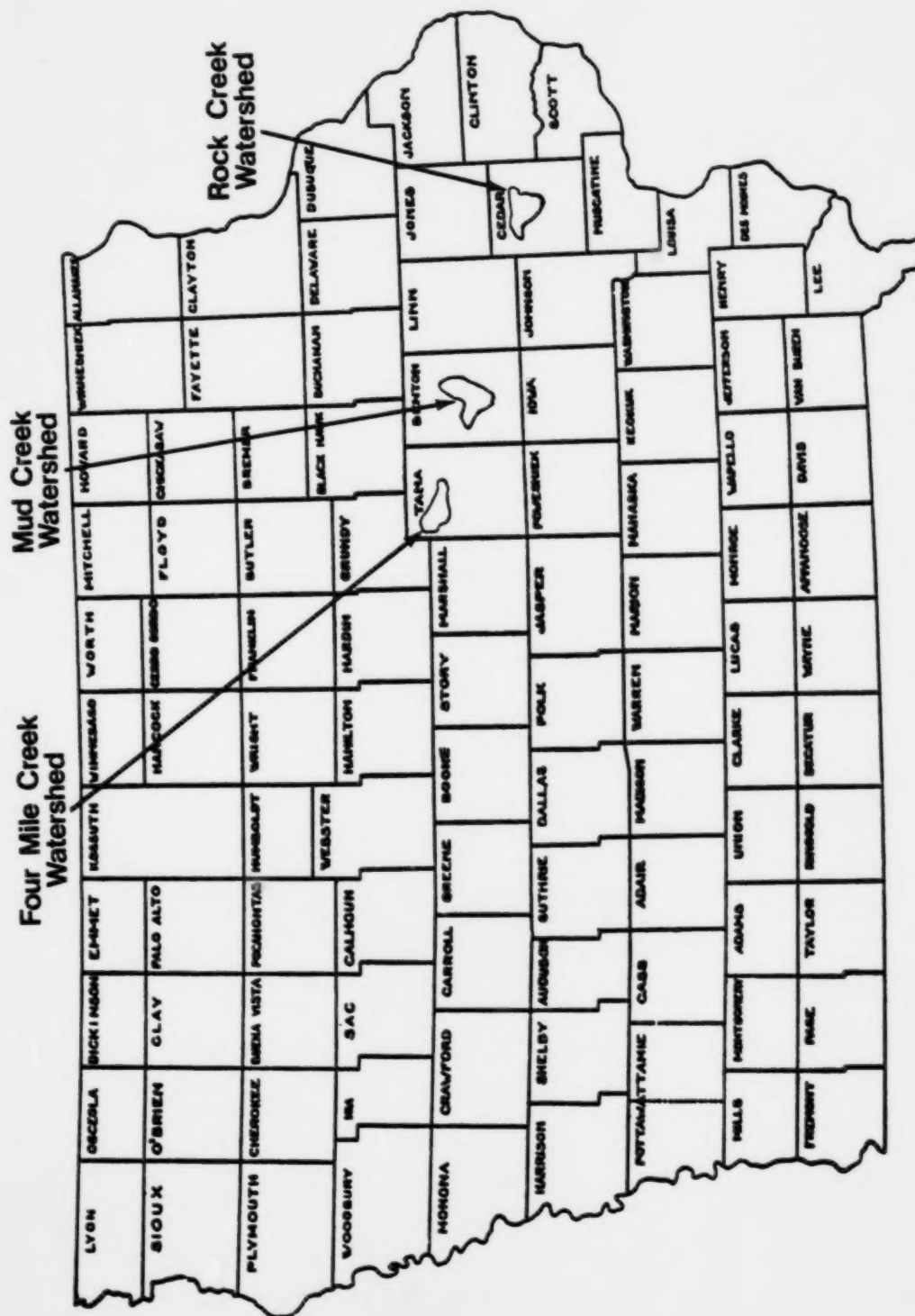
The Four Mile Creek Watershed in Tama County was the treatment area. This watershed was to receive the full impact of monetary incentives and educational and technical assistance programs to implement BMPs. The primary control area,

the Rock Creek Watershed in Cedar County, was to receive only special educational and technical assistance programs. The other control area, Mud Creek Watershed in Benton County, was to receive neither special monetary incentives nor educational and technical assistance, except as a part of the regular agricultural production and conservation programs of county, state, and federal agencies. A map which identifies the location of the watersheds is shown in Figure 3.

Due to the early termination of the project, as already noted, the research design could not be fully implemented. The control counties did not receive programs that were distinct from one another. Rather, they were combined as a single control group and were compared with the Four Mile Creek treatment area in assessing the effects of different BMP policies.

Specific implementation incentives provided in the Four Mile Creek Watershed included: on-site visits by the Project Practice Coordinators; a visit by a U.S. Senator; special ASCS 90 percent cost share arrangements; a project newsletter; local newspaper coverage; watershed meetings; and testimonials by local BMP users. Although these treatment effects were terminated after a relatively short period of time, they combined to make the Four Mile Creek Watershed unique in its exposure to BMP information and programs.

The Four Mile Creek area was a pre-determined site for this study due to an already existing data base, its representativeness, previous cooperation of farm operators, support from local agencies and organizations, and the availability of cost share funds. Selection of the additional sites was based on the desire to achieve a high degree of similarity between all study areas with regard to soil, topographic, and climatic conditions, as well as the socioeconomic characteristics of the farm operators. This was accomplished for



the physical factors through consultation with the Iowa Department of Soil Conservation. Similarity of socioeconomic characteristics was assessed at the county level through use of 1974 Census of Agriculture data. The study areas may be compared on the basis of their following descriptions. A summary of selected comparative statistics for the three watersheds is found at the end of this section in Table 1.

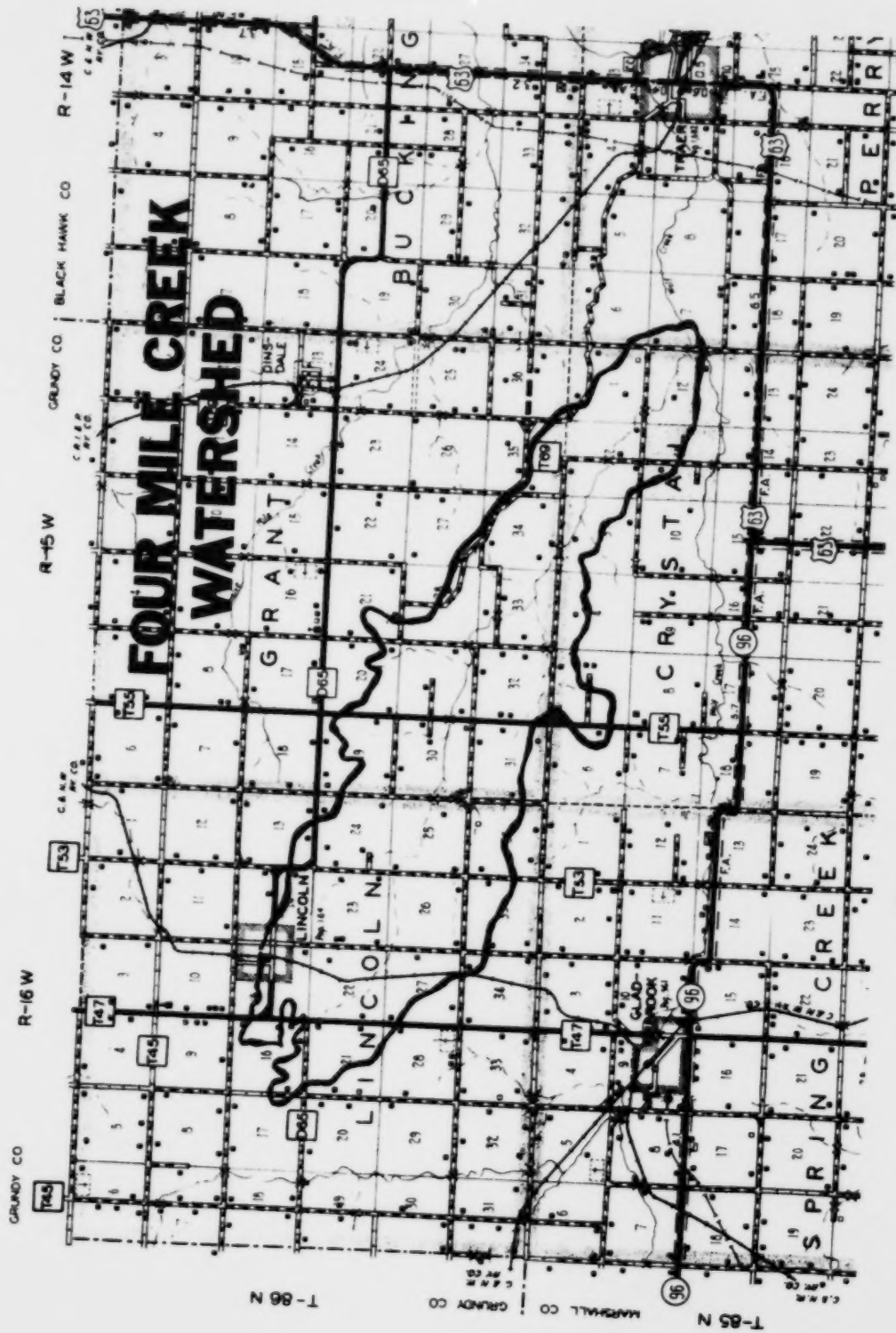
#### Four Mile Creek, Tama County

The Four Mile Creek Watershed is located in the northwest corner of Tama County. It is approximately ten miles in length from the northwest to the southeast tip, and is about two miles in width from the northern to the southern boundary. The land area covered by the watershed is approximately 12,000 acres. Ninety-five percent of this total is operated by respondents who were part of the saturation sample. Figure 4 shows the geographic location of the Four Mile Creek Watershed.

The mean annual temperature of the area is 47.6° F and mean annual precipitation is 32.4 inches. About 75 percent of the watershed is planted in corn and soybeans annually, with 20 percent going to small grains, meadow, and pasture, and 5 percent for buildings, roads, and other uses. The soils in the watershed are predominantly of loess origin and silt loam in texture. They are very productive soils, and crop yields are excellent. Much of the cropland has slopes of 5 - 12 percent, and on such lands runoff and soil erosion are high (Department of Agricultural Engineering, 1980).

With respect to socioeconomic factors, the average farm size for the county was 262 acres in 1974. The average value of buildings and land was \$750 per acre, and the average market value of farm products sold was \$84,356. Full owners worked 32 percent of the cropland, part owners worked 44 percent, and





## Tama County, Iowa

Figure 4. Location of Four Mile Creek Watershed in Tama County, Iowa



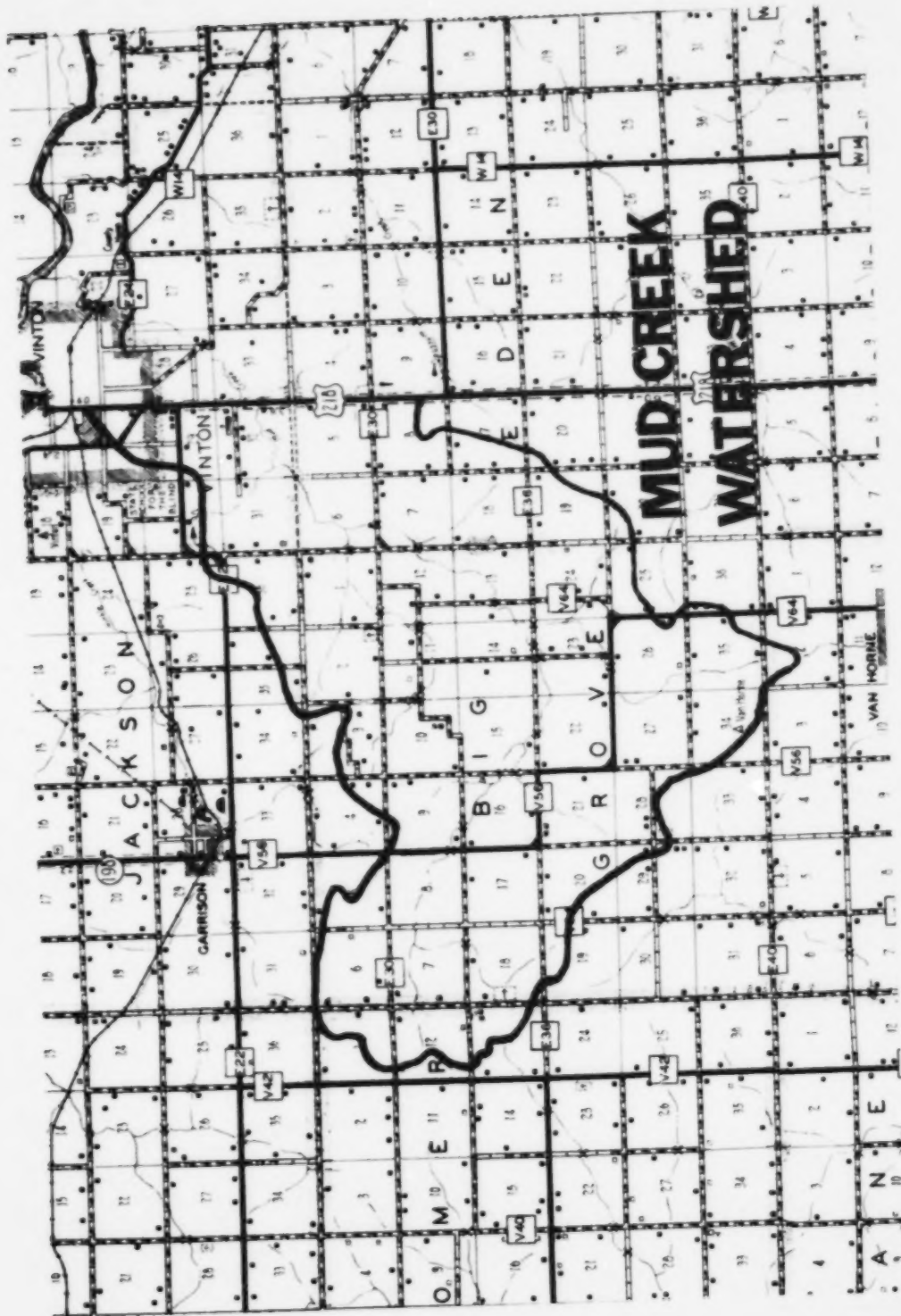
the remaining 24 percent was worked by full tenants (U.S. Department of Commerce, 1981).

#### Mud Creek, Benton County

The Mud Creek Watershed, located in west-central Benton County, covers nearly 19,000 acres of rich farmland on a loess-covered glacial till plain. For the county as a whole, 67 percent of the land is in cropland, 15 percent is pasture, 15 percent is woodland and other, and 5 percent is in urban use. Corn for grain and seed, soybeans, cattle, and hogs are the principal farm products (Brown and Highland, 1980). Figure 5 shows the location of the Mud Creek Watershed in Benton County.

The Mud Creek Watershed is approximately 8.5 miles from east to west at its widest point. U.S. Highway No. 218 served as the eastern watershed boundary for the purposes of the study. The point of greatest distance from north to south is about 6.5 miles. The total number of acres operated in the Mud Creek Watershed by respondents is approximately 11,500. This represents 62 percent of the total land area within the watershed. The average temperature for the area in winter is 22<sup>0</sup> F. In summer, the average temperature is 72<sup>0</sup> F. Average annual precipitation is 32.38 inches (Brown and Highland, 1980).

The socioeconomic profile of the county reveals that the average farm size for the area was 279 acres in 1974. The average market value of products sold was \$94,438, and the average value of land and buildings was \$824 per acre. Full owners worked 32 percent of the cropland and part owners worked 44 percent, while full tenants worked 24 percent of the land. Ninety percent of the farms were family or individual organizational types (U.S. Department of Commerce, 1981).



## Benton County, Iowa

Figure 5. Location of Mud Creek Watershed in Benton County, Iowa

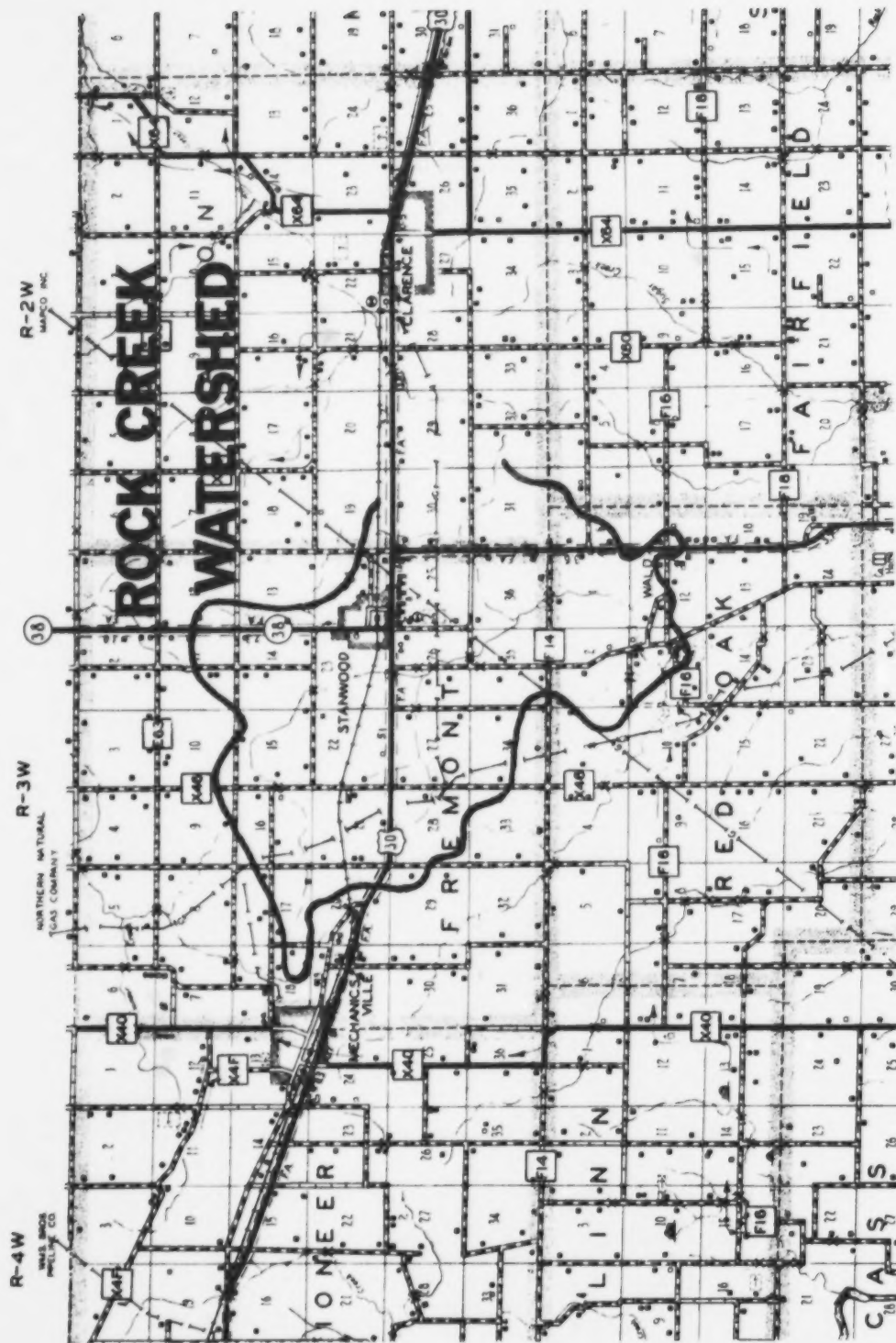
### Rock Creek, Cedar County

Rock Creek Watershed is located in north central Cedar County. It covers approximately 11,500 acres. The dominant soil associations include Fayette-Downs, Tama-Downs, Tama-Muscatine, and Dinsdale-Klinger. The principal crops are corn and soybeans which occupy 62 percent of the county's agricultural land. Fifteen percent of the land is used for pasture, 12 percent for small grains and hay, and the remaining 11 percent for other purposes. Beef cattle, hogs, and dairying are also important sources of income. The location of the Rock Creek Watershed in Cedar County is shown in Figure 6.

The average winter temperature for the county is 23<sup>0</sup> F. This figure rises to 72<sup>0</sup> F for the summer. Total annual precipitation is 26 inches (Schermerhorn, et al, 1979).

The Rock Creek Watershed is about five miles in width from east to west at the widest point. It runs about six miles in length from north to south. Of the total acres in the watershed, nearly 7,500 (or 65 percent) are operated by respondents who were part of the study.

The average farm size in the county was 260 acres in 1974, and average value of farm and buildings per acre was \$860. The average market value of agricultural products sold was \$87,609. Full owners worked 32 percent of the cropland, while 44 percent was worked by part owners and 24 percent by full tenants. The predominant type of farm organization was the individual or family operation (87 percent). Partnerships constituted 11 percent of the farm enterprises (U.S. Department of Commerce, 1981).



## Cedar County, Iowa

Figure 6. Location of Rock Creek Watershed in Cedar County, Iowa

Table 1: Selected Comparative Statistics for the Four Mile, Mud,  
and Rock Creek Watersheds

|                                                                | Four Mile Creek<br>(Tama County) | Mud Creek<br>(Benton County) | Rock Creek<br>(Cedar County) |
|----------------------------------------------------------------|----------------------------------|------------------------------|------------------------------|
| Total Acres<br>in Watershed                                    | 12,000                           | 19,000                       | 11,500                       |
| Average Annual<br>Precipitation                                | 32.4                             | 32.3                         | 26.0                         |
| Percent of Land<br>in Row Crops                                | 75                               | 67                           | 62                           |
| Average Farm Size (Acres)                                      | 262                              | 279                          | 260                          |
| Average Dollar Value<br>of Bldgs and Land/Acre                 | 750                              | 824                          | 860                          |
| Average Dollar Market<br>Value of Farm Products<br>Sold        | 84,356                           | 94,438                       | 87,607                       |
| Percent of Total<br>Watershed Acres Operated<br>by Respondents | 95                               | 62                           | 65                           |



## METHODS AND DATA

The study involved a series of four contacts with respondents over a two year period. The initial contact, in February and March of 1980, involved personal interviews conducted by the Sample Survey Section of the Iowa State University Statistical Laboratory. Interviewers were instructed to make contact with every rural resident within the physical boundaries of the respective watersheds. A screening procedure allowed for the determination of residents who did not operate farmland in the watersheds. It also allowed for an identification of persons who operated land surrounding a farmstead, but who did not reside on that farmstead. In the latter situation, an attempt was made to contact farm operators who operated land within the watershed but who resided outside its boundaries. A total N of 193 respondents were identified for inclusion in the study (Four Mile Creek, N= 73; Mud Creek, N= 65; Rock Creek, N= 55).

The intent of the first questionnaire centered on obtaining demographic background information, measurement of relevant attitudes (e.g., agrarianism, environmentalism, risk preference, innovativeness, etc.), organizational affiliation, community orientation, and the use and perceptions of various soil, water, and energy conservation practices. The initial questionnaire served to establish a large baseline of data against which future survey information would be compared and contrasted. In addition, it provided a cross-sectional description of a large number of sociological variables on the

need for and use of BMPs.

The second contact with respondents was made in the summer of 1980. This was a telephone survey conducted by interviewers from the Statistical Laboratory at Iowa State University. Its subject matter focused on farm firm characteristics. These included measures of the size of the farm operation, organizational type, tenure, on- and off-farm labor, farm decision making, and the acceptability of conservation policy alternatives. Following attrition in the respondent population due to the movement of operators and/or refusals, there were 183 completed telephone interviews for the second phase of the study.

In March of 1981, the third and fourth contacts were made with respondents. These contacts involved a personal interview and a mail questionnaire. The personal interview consisted of an identification of the field boundaries for all land operated by respondents who farmed any land in the Four-Mile, Mud, or Rock Creek Watersheds. This identification procedure made use of ASCS crop year photos, as well as additional aerial photos of the watersheds taken specifically for the research project. Detailed questions were asked regarding cropping and rotations, ownership status, use of implements, and average crop yields for each of the identified fields. In addition, farmers were asked questions about their awareness, knowledge, and use of BMPs, the main causes of and solutions for their soil erosion and water quality problems, and about their contacts with soil and water conservation information sources.

The primary purpose of the third contact was to obtain the necessary information to calculate the universal soil loss equation (USLE) and indicators of the productivity potential of land, e.g., the corn suitability rating (CSR), on a field-by-field basis. These physical factors could then be juxtaposed

with demographic, perceptual, and attitudinal factors in order to identify their relationship to the need for and use of BMPs. The resulting N for the third interview was 153.

The fourth respondent contact resulted from a mail-back questionnaire left with respondents at the time of the third interview. This questionnaire assessed attitudes on the continuing problem of soil erosion and water quality, attitudes toward general problems faced by farmers, and information on general farm practices and machine use and ownership. Information from this survey was used in conjunction with information from the previous surveys, and in comparison and contrast with information on personal characteristics of the respondents, farm firm characteristics, and physical and mechanical information about the farm. The number of completed mail-back questionnaires was 141.

Overall, the four respondent contacts provided an extensive set of data of farm operators' personal and socioeconomic characteristics, farm firm characteristics, and institutional factors related to the adoption and maintenance of BMPs.

### CHAPTER III. VARIABLES AND DESCRIPTIVE STATISTICS

Based upon the model outlined in Chapter II, four sets of independent variables are examined in this report as factors that impinge on BMP use. They are personal and socioeconomic characteristics of the farm operator, farm firm characteristics, land ecological characteristics, and institutional factors. These sets of factors are examined for their bearing on BMP use.

Two dependent variables are used in the analysis. These are an index of BMP usage and a measure of the amount of crop residue left on the soil surface at the time of spring planting. Since the purpose of the research was to examine the effect of sociological factors on the adoption of BMPs, the two variables are alternative measures of BMP adoption. The best management practice index measures the use of specific BMPs, and the average crop residue is a general measure of the use of conservation tillage.

#### DEPENDENT VARIABLES

##### Average Crop Residue

The amount of crop residue remaining at the time of spring planting was calculated on a per field basis utilizing information employed in the USLE. This allowed for an overall farm average of crop residue to be computed by weighting the amount of residue on individual fields by the relative number of acres of these fields in the total operation. Average pounds of crop residue per acre is an indicator of the use of conservation tillage as a BMP. Values for the overall sample ranged from approximately a 100 pound average per acre to a nearly 4000 pound average. The mean for the overall sample was 836 pounds

TABLE 2. Summary Statistics for Dependent Variables

| <u>Variable</u>                          |                       | <u>Overall<br/>Sample<br/>(N=193)</u> | <u>Experimental<br/>Watershed<br/>(N=73)</u> | <u>Control<br/>Watersheds<br/>(N=120)</u> |
|------------------------------------------|-----------------------|---------------------------------------|----------------------------------------------|-------------------------------------------|
| Average Crop<br>Residue<br>(pounds/acre) | Mean                  | 835.65                                | 745.25                                       | 890.89                                    |
|                                          | Median                | 628.00                                | 615.00                                       | 653.50                                    |
|                                          | Standard<br>Deviation | 681.13                                | 468.27                                       | 780.69                                    |
|                                          |                       |                                       |                                              |                                           |
| Index of BMP Use<br>(1-4 Practices)      | Mean                  | 2.02                                  | 2.08                                         | 1.98                                      |
|                                          | Meadian               | 1.93                                  | 1.96                                         | 1.90                                      |
|                                          | Standard<br>Deviation | 1.08                                  | 1.10                                         | 1.07                                      |
|                                          |                       |                                       |                                              |                                           |



of residue per acre. The mean for the experimental watershed was 745 pounds per acre, while this value stood at 891 pounds per acre for the control watershed.

#### Best Management Practice Index

An index combining four BMPs other than reduced tillage was computed. Respondents were assigned one point for each of the following practices which they had adopted--contour planting, strip cropping, sod waterways, and filter strips. The index ranged from 0 to 4. The mean number of practices used for the overall sample was 2. The mean for the experimental watershed and the mean for the control watersheds were approximately 2. Summary statistics for the dependent variables are presented in Table 2.

### INDEPENDENT VARIABLES

#### PERSONAL AND SOCIOECONOMIC CHARACTERISTICS

Awareness. Awareness of soil erosion and water quality problems is thought to influence BMP use. In order to assess the awareness of erosion and water quality problems, respondents were asked if soil erosion or water quality was a problem on their farms. The response format allowed for a four-point range of intensity from "not a problem" to "a major problem" for both the soil erosion and water quality problems.

Overall, nearly 65 percent of the respondents identified soil erosion as a small or non-existent problem on their farm, while 26 percent viewed it as a moderate problem. Only 9 percent saw erosion as a major problem. Differences emerged between the control and experimental watersheds. Only 7 percent of the respondents in the Four Mile Creek (experimental) Watershed viewed erosion as not a problem on their farms, while 18 percent saw it as a major problem.

Similar figures for the Rock and Mud Creek (control) Watersheds were 24 percent and 3 percent, respectively.

A higher percentage of respondents failed to identify a water quality problem on their farms than had identified a soil erosion problem. Overall, 55 percent saw no water quality problem on their farms, 28 percent noted a small problem, 12 percent identified a moderate problem, and 4 percent recognized a major problem with water quality on their farms. These differences were constant across the experimental and control watershed.

Risk. Risk propensity (preference or risk aversion) has traditionally been an important variable in understanding and predicting innovation behavior (Rogers and Shoemaker, 1971). A risk scale was constructed from responses to four statements having strong risk prone or risk averse dimensions. The statements were as follows:

I must be willing to take a number of risks to get ahead.

I regard myself as the kind of person who is willing to take a few more risks than others.

I am generally cautious about accepting new ideas.

I am reluctant about adopting new ways of doing things until I see them working for people around me.

Items one and two tap risk proneness, while the third and fourth items assess risk aversion.

Respondents expressed agreement or disagreement with the statements on a five-point scale ranging from strongly agree to strongly disagree. All items were coded so that a higher number reflected greater risk proneness. The Cronbach's alpha coefficient, which is an indicator of measurement reliability was 0.61. This is an acceptable level by convention for general attitudinal measures. The mean risk propensity score for the overall sample, as well as for the experimental and control watersheds, was 3.3. This indicates only a

TABLE 3. Summary Statistics for Personal and Socioeconomic Characteristics--  
Risk, Education, and Experience

| <u>Variable</u>                   |                       | <u>Overall<br/>Sample<br/>(N=193)</u> | <u>Experimental<br/>Watershed<br/>(N=73)</u> | <u>Control<br/>Watersheds<br/>(N=120)</u> |
|-----------------------------------|-----------------------|---------------------------------------|----------------------------------------------|-------------------------------------------|
| Risk                              |                       |                                       |                                              |                                           |
| 1 = Risk Averse<br>5 = Risk Prone | Mean                  | 3.32                                  | 3.32                                         | 3.32                                      |
|                                   | Median                | 3.31                                  | 3.26                                         | 3.36                                      |
|                                   | Standard<br>Deviation | 0.63                                  | 0.62                                         | 0.64                                      |
| Education                         |                       |                                       |                                              |                                           |
| Highest Year<br>Completed         | Mean                  | 12.00                                 | 11.80                                        | 12.17                                     |
|                                   | Median                | 12.00                                 | 11.94                                        | 12.09                                     |
|                                   | Standard<br>Deviation | 2.19                                  | 1.95                                         | 2.32                                      |
| Farm Experience                   |                       |                                       |                                              |                                           |
| Years Farm<br>Operator            | Mean                  | 22.30                                 | 23.12                                        | 21.80                                     |
|                                   | Median                | 22.00                                 | 24.00                                        | 20.25                                     |
|                                   | Standard<br>Deviation | 13.14                                 | 12.06                                        | 13.77                                     |

slight tendency in the direction of risk proneness among the respondents.

Education. Formal education was measured by asking respondents to report the highest grade of school which they had completed. The overall mean years of schooling completed was 12. This value was slightly higher for the control watersheds (12.2 years) than for the experimental watershed (11.8 years).

Experience. Years of farm experience, a variable which is highly correlated with age, was assessed by asking respondents how many years they have been farm operators. For the overall sample, the mean years for being a farm operator was 22.3 years. This number was slightly higher in the experimental watershed (23.1 years) than in the control watersheds (21.8 years). Summary statistics for the risk, education, and farm experience variables appear in Table 3.

Stewardship. Attitudes toward preserving soil and water resources may have an important effect on the use of BMPs. Stewardship is one such attitude. It implies a moral obligation on the part of land users to preserve resources for use by other persons and by future generations. To measure stewardship, respondents were asked to indicate which of several statements best represented their views. At the extremes, the statements reflected no moral obligation to maintain soil and water resources versus a moral obligation regardless of the costs. A tradeoff was introduced in the remaining statements. Farmers were asked if there was a moral obligation to maintain soil and water resources if the cost to an individual exceeded the annual amounts of \$500, \$2500, or \$4500, successively.

For the overall sample, 42 percent of the respondents stated that there was a moral obligation to maintain soil and water resources regardless of the cost to an individual. Only 10 percent stated that there was no moral obligation to maintain soil and water resources. In the experimental watershed

very few individuals (only 6 percent) indicated no stewardship obligation. Forty percent noted a moral obligation only if the cost was less than \$500 in a year, while an additional 20 percent put an upper limit of \$2,500 on a conservation obligation. Thirty percent perceived a moral obligation regardless of cost. In the control watersheds, 12 percent of the respondents identified no moral obligation, 17 percent identified a moral obligation at each of the \$500 and \$2,500 levels, 4 percent noted a moral obligation at the \$4,500 level of annual expenditure by an individual, and 50 percent stated that there was a moral obligation regardless of cost.

Perceived Cause. Perceptions about the causes of erosion were measured through an open-ended question which asked respondents what they felt were the main causes of soil erosion problems. Answers were classified into two main categories. The first included physical or ecological factors such as wind, water, and topography. A second group of causes centered on management factors that were controllable by the farmer. Some respondents gave combinations of the two types. The first type of answer can be viewed as somewhat fatalistic. The second recognizes that soil erosion problems are strongly affected by human decisions and actions.

Thirty-eight percent of the overall sample identified physical factors as the main causes of soil erosion, while 48 percent identified management factors as major. Twelve percent of the sample mentioned both while noting physical factors first, followed by management factors. An additional 3 percent noted these same factors in the opposite direction. This response trend was similar for the experimental and control watersheds, with the exception that more respondents in the experimental watershed noted, in order of priority, combinations of physical and management factors. Summary statistics for the awareness, stewardship, and the perceived cause variables are found in Table 4.



**TABLE 4:** Summary Statistics for Personal and Socioeconomic Characteristics Having Categorical Referents--Awareness, Stewardship and Perceived Cause of Soil Erosion

| <u>Variable</u>                                              | <u>Percent Responding in Category</u> |                                      |                                   |
|--------------------------------------------------------------|---------------------------------------|--------------------------------------|-----------------------------------|
|                                                              | <u>Overall Sample (N=193)</u>         | <u>Experimental Watershed (N=73)</u> | <u>Control Watersheds (N=120)</u> |
| Awareness--Soil Erosion as a Problem                         |                                       |                                      |                                   |
| 1. Not a problem                                             | 17.6                                  | 6.8                                  | 24.2                              |
| 2. Small Problem                                             | 47.2                                  | 45.2                                 | 48.3                              |
| 3. Medium Problem                                            | 26.4                                  | 30.1                                 | 24.2                              |
| 4. Major Problem                                             | 8.8                                   | 17.8                                 | 3.3                               |
|                                                              | <u>100.0</u>                          | <u>99.9</u>                          | <u>100.0</u>                      |
| Awareness--Water Quality as a Problem                        |                                       |                                      |                                   |
| 1. Not a problem                                             | 55.4                                  | 54.8                                 | 55.8                              |
| 2. Small problem                                             | 28.5                                  | 24.7                                 | 30.8                              |
| 3. Medium problem                                            | 11.9                                  | 16.4                                 | 9.2                               |
| 4. Major problem                                             | 4.1                                   | 4.1                                  | 4.2                               |
|                                                              | <u>99.9</u>                           | <u>100.0</u>                         | <u>100.0</u>                      |
| Stewardship--Obligation to Maintain Soil and Water Resources |                                       |                                      |                                   |
| 1. No Moral Obligation                                       | 9.8                                   | 6.0                                  | 12.2                              |
| 2. Moral Obligation if < \$500 Annual Cost                   | 25.8                                  | 40.0                                 | 17.1                              |
| 3. Moral Obligation if < \$2500 Annual Cost                  | 18.2                                  | 20.0                                 | 17.1                              |
| 4. Moral Obligation if < \$4500 Annual Cost                  | 3.8                                   | 4.0                                  | 3.7                               |
| 5. Moral Obligation Regardless of Cost                       | 42.4                                  | 30.0                                 | 50.0                              |
|                                                              | <u>100.0</u>                          | <u>100.0</u>                         | <u>100.1</u>                      |
| Perceived Cause of Soil Erosion Problem                      |                                       |                                      |                                   |
| 1. Ecological Factors                                        | 37.5                                  | 32.2                                 | 40.9                              |
| 2. Ecological and Management Factors (order of mention)      | 11.8                                  | 18.6                                 | 7.5                               |
| 3. Management and Ecological Factors (order of mention)      | 2.6                                   | 3.4                                  | 2.2                               |
| 4. Management Factors                                        | 48.0                                  | 45.8                                 | 49.5                              |
|                                                              | <u>99.9</u>                           | <u>100.0</u>                         | <u>100.1</u>                      |

### Farm Firm Characteristics

In addition to personal factors, farm firm characteristics also influence the use of BMPs. A discussion of the measurement of these variables follows. Descriptive statistics are summarized in Tables 5 and 6.

Total Acres. Total acres in the farming operation were obtained by asking respondents the number of acres owned and operated, the number of acres cash rented, and the number of acres crop shared for their operation in the 1980 crop year. Farms ranged in size from 40 acres to 1740 acres for the overall sample. The mean farm size was 451 acres. For the experimental watershed, the range of farm size was the same as for the full sample. The mean farm size was 496 acres. In the control watersheds, farm size varied between 80 and 1500 acres. The mean farm size was 425 acres.

Tenure. Tenure was measured as the ratio of owned land to total acres in the operation. Tenure was computed by dividing the acres owned and operated by the total number of acres operated. Scores ranged from zero (no owned land) to one (all owned land). For the overall sample the mean score for proportion of owned land was 0.47. The mean score of owned land was 0.36 in the experimental watershed. In the control watersheds, the mean proportion of owned land was 0.54.

Income. Two measures of income were utilized. The first asked respondents to indicate their average annual gross farm incomes, within specified categories, over the three year period, 1977-1979. The second measure assessed the same information in regard to non-farm income. The modal gross farm income category for the overall sample was \$50,000-\$99,999. This was the same for the experimental and control watersheds. For non-farm income, the modal category was more than zero but less than \$5000 in the experimental

TABLE 5. Summary Statistics for Farm Firm Characteristics--Total Acres, Tenure, Hired Labor and Land Use Intensity

| <u>Variable</u>                                                         |                       | <u>Overall<br/>Sample<br/>(N=193)</u> | <u>Experimental<br/>Watershed<br/>(N=73)</u> | <u>Control<br/>Watersheds<br/>(N=120)</u> |
|-------------------------------------------------------------------------|-----------------------|---------------------------------------|----------------------------------------------|-------------------------------------------|
| Total Acres<br>Operated                                                 | Mean                  | 451.3                                 | 495.7                                        | 424.7                                     |
|                                                                         | Median                | 359.8                                 | 347.5                                        | 359.9                                     |
|                                                                         | Standard<br>Deviation | 329.4                                 | 387.2                                        | 287.9                                     |
| Tenure<br>(Proportion of<br>Operation Owned)                            | Mean                  | 0.47                                  | 0.36                                         | 0.54                                      |
|                                                                         | Median                | 0.40                                  | 0.25                                         | 0.53                                      |
|                                                                         | Standard<br>Deviation | 0.44                                  | 0.37                                         | 0.47                                      |
| Hired Labor<br>(Days of Hired<br>Labor in a Year)                       | Mean                  | 72.5                                  | 83.6                                         | 66.8                                      |
|                                                                         | Median                | 5.3                                   | 4.5                                          | 6.0                                       |
|                                                                         | Standard<br>Deviation | 144.0                                 | 146.1                                        | 143.5                                     |
| Land Use Intensity<br>(Proportion of<br>Farm Operation<br>in Row Crops) | Mean                  | 0.64                                  | 0.49                                         | 0.75                                      |
|                                                                         | Median                | 0.67                                  | 0.44                                         | 0.78                                      |
|                                                                         | Standard<br>Deviation | 0.27                                  | 0.26                                         | 0.24                                      |

watershed. The modal non-farm income category was "none" for the overall sample and the control watersheds.

Farm Organization Type. The business organization of the farm firm was assessed for its complexity ranging from a single family operation to a corporation of unrelated individuals. For the overall sample, 76 percent were single family operations, 11 percent were partnerships of unrelated individuals, 5 percent were single family corporations, 2 percent were partnerships of unrelated individuals, and 6 percent were multi-family corporations. In the experimental watershed, 72 percent of the operations were single family, 14 percent were partnerships between relatives, 6 percent were single family corporations, and 8 percent were multi-family corporations. For the control watersheds, 78 percent were single family operations, 9 percent were partnerships between related individuals, 4 percent were single family corporations, 2 percent were partnerships between unrelated individuals, and 6 percent were multi-family farms corporations. Clearly, the predominant type of farm firm organization in both the experimental and control watersheds was the single family operation.

Hired Labor. Use of hired labor is included as a farm firm characteristic. It was measured by asking farmers to indicate the total number of days of full-time hired labor, days of part-time hired labor, and days of occasional hired labor used the previous year in their farming operation. The mean days of hired labor used in the overall sample was 72.5 days. This figure stood at 83.6 and 66.8 for the experimental and control watersheds, respectively. Further, the median days of hired labor was 5.3 days in the overall sample, 4.5 days in the experimental watershed, and 6 days in the control watershed.

Use of Credit. Farmers were asked about their past reliance on the use of

TABLE 6: Summary Statistics for Farm Firm Characteristics Having Categorical Referents--Income, Organization Type, and Use of Credit

| Variable                                                | Percent Responding in Category |                                  |                               |
|---------------------------------------------------------|--------------------------------|----------------------------------|-------------------------------|
|                                                         | Overall Sample<br>(N=193)      | Experimental Watershed<br>(N=73) | Control Watersheds<br>(N=120) |
| Income: Average Gross Farm<br>(Average Gross Non-Farm)  |                                |                                  |                               |
| 1. None                                                 | (---) (51.8)                   | (---) (42.9)                     | (---) (58.0)                  |
| 2. Less than 5000                                       | 0.5 (27.1)                     | 1.4 (34.3)                       | (---) (22.0)                  |
| 3. 5000-9999                                            | 0.5 (8.2)                      | (---) (8.6)                      | 0.9 (8.0)                     |
| 4. 10000-19999                                          | 6.0 (6.5)                      | 8.7 (7.1)                        | 4.4 (6.0)                     |
| 5. 20000-29999                                          | 6.6 (4.7)                      | 7.2 (4.3)                        | 6.1 (5.0)                     |
| 6. 30000-39999                                          | 6.6 (0.6)                      | 7.2 (---)                        | 6.1 (1.0)                     |
| 7. 40000-49999                                          | 7.7 (---)                      | 7.2 (---)                        | 7.9 (---)                     |
| 8. 50000-99999                                          | 32.8 (0.6)                     | 29.0 (1.4)                       | 35.1 (---)                    |
| 9. 100000-149999                                        | 18.6 (---)                     | 15.9 (---)                       | 20.2 (---)                    |
| 10. 150000-199999                                       | 6.6 (---)                      | 7.2 (---)                        | 6.1 (---)                     |
| 11. 200000-299999                                       | 7.1 (---)                      | 4.3 (---)                        | 8.8 (---)                     |
| 12. 300000-399999                                       | 3.8 (---)                      | 5.8 (---)                        | 2.6 (---)                     |
| 13. Over 400000                                         | 3.3 (0.6)                      | 5.8 (1.4)                        | 1.8 (---)                     |
| Farm Organization Type                                  |                                |                                  |                               |
| 1. Single Family                                        | 75.9                           | 71.9                             | 78.2                          |
| 2. Partnership of Related Individuals                   | 10.9                           | 14.1                             | 9.1                           |
| 3. Single Family Corporation                            | 5.2                            | 6.3                              | 4.5                           |
| 4. Partnership of Related and<br>Nonrelated Individuals | (---)                          | (---)                            | (---)                         |
| 5. Partnership of Nonrelated<br>Individuals             | 1.7                            | (---)                            | 2.7                           |
| 6. Multi-family Corporation                             | 6.3                            | 7.8                              | 5.5                           |
| Use of Credit                                           |                                |                                  |                               |
| 1. None                                                 | 13.0                           | 17.8                             | 10.0                          |
| 2. Small Degree                                         | 21.2                           | 21.9                             | 20.8                          |
| 3. Moderate Degree                                      | 31.1                           | 24.7                             | 35.0                          |
| 4. Large Degree                                         | 34.7                           | 35.6                             | 34.2                          |



credit to acquire such items as land, machinery, farm buildings and livestock. Degree of reliance on credit was measured on a four point scale ranging from no reliance on credit to relying on credit to a large degree. For the overall sample, 13 percent did not rely on credit at all, 21 percent used it to a small degree, 31 percent used it moderately, and 35 percent used it to a large degree. Eighteen percent in the experimental watershed indicated that they did not use credit at all, 22 percent said they used it to a small degree, 25 percent used it to a moderate degree, and 36 percent used credit to a large degree. The percentages for the control watersheds were 10 percent not at all, 21 percent to a small degree, 35 percent to a moderate degree, and 34 percent to a large degree.

Land Use Intensity. The proportion of acres in continuous use for row crops is a measure of the intensity of the use of one's soil resource. This variable was computed by dividing the number of acres in continuous use for row crops by the total number of acres in the operation. Values for the variable had a potential range from 0 (no row crops) to 1 (all land in row crops). For the overall sample, the mean proportion of acres in row crops was 0.64. The mean value was 0.49 for the experimental watershed and 0.75 for the control watershed.

#### LAND ECOLOGICAL CHARACTERISTICS

A third set of independent variables to be considered in this analysis include ecological or physical factors of the land. They are included out of the recognition that characteristics of the farmland being operated will have an impact on whether or not BMPs are adopted and which type of BMPs are adopted. The present set of ecological variables, while limited in scope, attempts to incorporate several important physical factors in the explanation of the use of

BMPs. Summary statistics for land ecological variables are presented in Table 7.

Average Soil Erosion Rate. The average predicted soil erosion rate in tons/acre/year was calculated for each farm operation in the sample on a field-by field basis utilizing the Universal Soil Loss Equation (USLE). Much of the information for calculating the USLE was acquired in the third contact with respondents. Farmers were asked to identify the individual fields in their operation from ASCS crop year photos. For each field, information was then obtained on crop rotation, crop yield, BMP use, and fall and spring implement use. Technicians used this information in conjunction with soil surveys and USLE factor tables to estimate the annual soil erosion rate on each field for each farm. Each farm's overall average soil erosion rate was computed by weighting each field's rate by the number of acres in that field and dividing by the total acres in the operation.

Average soil erosion rates varied between 1.2 and 26.0 tons/acre/year in the experimental watershed. The mean erosion rate for this watershed was 9.9 tons/acre/year. In the control watersheds the mean average erosion rate was 7.6 tons/acre/year, varying between 1.1 and 26.9 tons/acre/year. The average erosion rate was 8.5 tons/acre/year for the whole sample.

Average Erosion Potential (RKLS). This set of USLE factors, when taken together, indicates the erosion potential of land without consideration of BMPs. It incorporates rainfall (R), soil erodibility (K), slope length (L), and slope gradient (S). An average for each farm was calculated by weighting the RKLS on each field by the number of acres in the field and dividing by the total number of acres in the operation. In interpreting the RKLS factor, the coefficient increases in size with an increase in the erosion potential of the land. For the experimental watershed, the values for RKLS ranged between 12.0

TABLE 7: Summary Statistics for Land Ecological Factors

| <u>Variable</u>                                                                |                       | <u>Overall<br/>Sample<br/>(N=193)</u> | <u>Experimental<br/>Watershed<br/>(N=73)</u> | <u>Control<br/>Watersheds<br/>(N=120)</u> |
|--------------------------------------------------------------------------------|-----------------------|---------------------------------------|----------------------------------------------|-------------------------------------------|
| Average Erosion Rate<br>(tons/acre/year)                                       | Mean                  | 8.46                                  | 9.89                                         | 7.59                                      |
|                                                                                | Median                | 7.53                                  | 9.35                                         | 7.00                                      |
|                                                                                | Standard<br>Deviation | 5.30                                  | 5.83                                         | 4.77                                      |
| Average Erosion<br>Potential (RKLS)<br>(Higher numbers=<br>higher erodibility) | Mean                  | 39.52                                 | 47.51                                        | 34.59                                     |
|                                                                                | Median                | 33.07                                 | 41.05                                        | 30.60                                     |
|                                                                                | Standard<br>Deviation | 25.01                                 | 26.21                                        | 23.07                                     |
| Corn Suitability Rating<br><br>5 = Lowest<br>99 = Highest                      | Mean                  | 78.74                                 | 74.08                                        | 81.60                                     |
|                                                                                | Median                | 80.29                                 | 73.90                                        | 82.00                                     |
|                                                                                | Standard<br>Deviation | 8.14                                  | 9.17                                         | 5.84                                      |

and 114.0. The mean value was 47.5. In the control watersheds, values ranged between 7.3 and 156.1, with a mean of 34.6. The mean for the overall sample was 39.5. The medians for the experimental and control watersheds were 31 and 41, respectively. The overall median was 33.

Corn Suitability Factor. Corn suitability rating (CSR) indicates the quality of the land that is being farmed. Ratings have a potential range between 100 for soils which have no physical limitations and which occur on minimal slopes, to as low as five for soils with severe limitations for row crops. An average CSR for each farm was calculated by weighting the CSR for each field by the number of acres in that field and dividing by the total number of acres. The mean CSR value for the overall sample was 78.7. CSR values for the experimental watershed ranged between 50 and 95, with a mean of 74. Values in the control watershed went from a low of 58 to a high of 96. The mean value for the control watersheds was 82.

#### INSTITUTIONAL FACTORS

The final set of variables examined is referred to as institutional factors. Three institutional factors are identified. The first involves contacts by the respondents with organizations having relevant information for soil conservation and water quality. The second deals specifically with the receipt of cost share funds for conservation purposes. The last centers on the presence and implementation of a conservation plan which specifies both potential problems and recommended solutions. Table 7 contains a summary of descriptive statistics for the institutional factors.

Information Behavior. Respondents were asked the number of times that they visited or talked with a member of the Soil Conservation Service (SCS), Agricultural Stabilization and Conservation Service (ASCS), or local Soil

Conservation District Commission in the year preceding the interview. The total number of such visits was recorded for each respondent. The numbers ranged from 0 to 81 visits in the overall sample. The mean number of visits, was 8.6, and the median number was 5. For the experimental watershed, the mean was 10 and the median was 6. In the control watersheds, the mean number of visits was 7.6 and the median visits was 4.5.

Proportion of Cost Shared Practices. The second institutional variable included in the analysis is the proportion of conservation practices used for which any cost share funds had been received. The five practices considered were contour planting, strip cropping, terracing, sod waterways, and filter strips. The mean proportion of practices for which cost shared funds were received in the experimental watershed was 0.22. The mean proportion for the control watersheds was 0.18. The overall mean was 0.19.

Conservation Plan. The final institutional factor is whether the respondent had an SCS Conservation Plan prepared, and on a scale from 1 to 4, the degree to which it was implemented. In the experimental watershed, 38 percent of the respondents did not have a Conservation Plan, 10 percent had a plan prepared but it was not implemented, 44 percent had a partially implemented plan, and 8 percent had a fully implemented plan. For the control watershed 43 percent did not have a plan, 2 percent had a plan of which none was implemented, 36 percent had a partially implemented plan and 19 percent had a fully implemented plan. The respective values for the overall sample were 41 percent not having a plan, 5 percent having a plan which had not been implemented at all, 39 percent having a partially implemented plan, and 15 percent having a fully implemented plan.



**TABLE 8: Summary Statistics for Institutional Factors Having Categorical Referents--Soil Conservation Plan, Information Contacts and Proportion of Cost Shared Practices**

| <u>Variable</u>                                           |                    | <u>Percent Responding in Category</u> |                                      |                                   |
|-----------------------------------------------------------|--------------------|---------------------------------------|--------------------------------------|-----------------------------------|
|                                                           |                    | <u>Overall Sample (N=193)</u>         | <u>Experimental Watershed (N=73)</u> | <u>Control Watersheds (N=120)</u> |
| Soil Conservation Plan                                    |                    |                                       |                                      |                                   |
| 1. No Plan                                                |                    | 40.9                                  | 38.4                                 | 42.5                              |
| 2. Have Plan, But Not Implemented                         |                    | 5.2                                   | 9.6                                  | 2.5                               |
| 3. Partially Implemented Plan                             |                    | 38.9                                  | 43.8                                 | 35.8                              |
| 4. Fully Implemented Plan                                 |                    | 15.0                                  | 8.2                                  | 19.2                              |
| Information Behavior<br>(Number of Contacts in past year) | Mean               | 8.58                                  | 10.10                                | 7.58                              |
|                                                           | Median             | 5.09                                  | 5.81                                 | 4.50                              |
|                                                           | Standard Deviation | 11.03                                 | 12.83                                | 9.63                              |
| Proportion of Practices Cost Shared                       | Mean               | 0.19                                  | 0.22                                 | 0.18                              |
|                                                           | Median             | 0.01                                  | 0.02                                 | 0.01                              |
|                                                           | Standard Deviation | 0.32                                  | 0.32                                 | 0.33                              |

#### CHAPTER IV. RESULTS AND DISCUSSION

This chapter presents the analysis of the relationships between BMP usage and factors that affect adoption. The main focus will be to compare the significant findings for the experimental group (Four Mile Creek Watershed) with the control group (Mud Creek and Rock Creek Watersheds). The two dependent variables will be discussed separately for each group.

The analysis of the individual independent variables' relationships with each dependent variable is summarized in Table 9. Complete correlation matrices for all variables can be found in Table 10. The discussion in this chapter will center on the multivariate analysis using multiple regression to determine the relative influence of the independent variables on each of the dependent variables. A two stage analysis procedure was used to develop a reduced model that would explain the most variance in each dependent variable while including only the most important independent variables. In the first stage, the regression equation included all of the independent variables for each dependent variable. Based upon the results of the first stage, only statistically significant variables were retained for inclusion in the second stage resulting in a reduced model, that is, a model with fewer, more predictive, variables.

##### MODEL REDUCTION

Initially, 24 separate multiple regression equations were developed for the following combinations: each set of independent variables (personal and socioeconomic characteristics, farm firm characteristics, land ecological factors, and institutional factors) was regressed on the two dependent variables for the control and experimental groups. These equations are

**TABLE 9: Pearson Correlations Between Independent and Dependent Variables in Experimental and Control Watersheds**

| INDEPENDENT VARIABLES            |          | DEPENDENT VARIABLES    |                   |                    |                   |
|----------------------------------|----------|------------------------|-------------------|--------------------|-------------------|
|                                  |          | Experimental Watershed |                   | Control Watersheds |                   |
|                                  |          | $\underline{Y_1}$      | $\underline{Y_2}$ | $\underline{Y_1}$  | $\underline{Y_2}$ |
| <b>Personal Factors</b>          |          |                        |                   |                    |                   |
| Awareness--Soil Erosion          | $X_1$    | -.01                   | .05               | .09                | -.01              |
| Awareness--Water Quality         | $X_2$    | -.04                   | .02               | .05                | .00               |
| Risk                             | $X_3$    | .07                    | .19               | .36*               | .18*              |
| Education                        | $X_4$    | -.03                   | .06               | .19*               | .08               |
| Farm Experience                  | $X_5$    | .01                    | -.05              | -.15               | -.03              |
| Stewardship                      | $X_6$    | .34*                   | .27*              | .22*               | .18*              |
| Perceived Erosion Cause          | $X_7$    | -.06                   | -.03              | .11                | .00               |
| <b>Farm Firm Characteristics</b> |          |                        |                   |                    |                   |
| Total Acres                      | $X_8$    | .10                    | -.12              | .14                | .17               |
| Tenure                           | $X_9$    | .25*                   | -.04              | .10                | .14               |
| Gross Farm Income                | $X_{10}$ | .30*                   | -.05              | .14                | -.01              |
| Gross Non-Farm Income            | $X_{11}$ | .19                    | .25*              | -.01               | -.15              |
| Farm Organization Type           | $X_{12}$ | .10                    | .03               | .08                | -.05              |
| Hired Labor                      | $X_{13}$ | .15                    | .21               | .16                | .09               |
| Use of Credit                    | $X_{14}$ | .25*                   | .26*              | .30*               | .28*              |
| Row Crop Intensity               | $X_{15}$ | .07                    | -.43*             | -.19*              | .03               |
| <b>Ecological Factors</b>        |          |                        |                   |                    |                   |
| Average Erosion Rate             | $X_{16}$ | -.29*                  | -.06              | -.29*              | .04               |
| Average Erosion Potential        | $X_{17}$ | -.13                   | .13               | .11                | .27*              |
| Corn Suitability Rating          | $X_{18}$ | .16                    | -.24*             | -.23*              | -.41*             |
| <b>Institutional Factors</b>     |          |                        |                   |                    |                   |
| Agency Contacts                  | $X_{19}$ | .14                    | .40*              | .55*               | .10               |
| Cost-Shared Practices            | $X_{20}$ | .32                    | .41*              | -.01               | .28*              |
| SCS Conservation Plan            | $X_{21}$ | .27*                   | .12               | .22*               | .41*              |

\* Significant at the .05 level.  
13,55,68,85

Table 10: Zero Order Pearson Correlations between All Variables; Experimental Watershed Above the Diagonal; Control Watersheds Below the Diagonal

|                                    | Y <sub>1</sub>  | Y <sub>2</sub> | X <sub>1</sub> | X <sub>2</sub> | X <sub>3</sub> | X <sub>4</sub> | X <sub>5</sub> | X <sub>6</sub> | X <sub>7</sub> | X <sub>8</sub> | X <sub>9</sub> | X <sub>10</sub> | X <sub>11</sub> | X <sub>12</sub> | X <sub>13</sub> | X <sub>14</sub> | X <sub>15</sub> | X <sub>16</sub> | X <sub>17</sub> | X <sub>18</sub> | X <sub>19</sub> | X <sub>20</sub> | X <sub>21</sub> |      |
|------------------------------------|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------|
| Average Crop Residue               | Y <sub>1</sub>  | ---            | .07            | .00            | -.04           | .06            | -.02           | .00            | .34            | -.06           | .09            | .25             | .30             | .19             | .09             | .15             | .25             | .06             | -.29            | -.13            | .15             | .13             | .32             | .27  |
| Conservation Practice Index        | Y <sub>2</sub>  | .32            | ---            | .05            | .02            | .19            | .05            | .28            | -.02           | .12            | -.04           | -.05            | .25             | .03             | .21             | .25             | -.43            | -.06            | .13             | -.24            | .35             | .40             | .11             |      |
| Awareness--Soil Erosion            | X <sub>1</sub>  | .09            | -.00           | ---            | .45            | -.06           | .20            | -.01           | -.02           | .09            | -.05           | .19             | -.03            | .05             | -.01            | -.09            | -.03            | .08             | -.01            | -.02            | -.09            | .20             | -.09            | -.02 |
| Awareness--Water Quality           | X <sub>2</sub>  | .04            | .00            | .33            | ---            | -.01           | .22            | -.21           | -.06           | .12            | .21            | -.01            | .13             | .03             | .02             | .17             | .15             | -.10            | .08             | .09             | .01             | -.06            | -.08            | .02  |
| Risk                               | X <sub>3</sub>  | .36            | .18            | .14            | .10            | ---            | .28            | -.13           | .29            | .05            | .34            | -.02            | .38             | .13             | .15             | .30             | .40             | -.14            | -.06            | -.01            | .05             | .08             | .31             | .24  |
| Education                          | X <sub>4</sub>  | .19            | .07            | .33            | .17            | .31            | ---            | -.58           | .16            | .13            | -.20           | .28             | .32             | .12             | .45             | .27             | .30             | -.03            | -.16            | -.18            | .28             | .13             | .12             | -.02 |
| Farm Experience                    | X <sub>5</sub>  | .15            | -.02           | .22            | .20            | .12            | -.29           | ---            | -.08           | -.21           | -.28           | .61             | .23             | .15             | .31             | .04             | .42             | .05             | .01             | .16             | -.20            | .05             | -.08            | -.02 |
| Stewardship                        | X <sub>6</sub>  | .22            | .18            | .12            | .04            | .09            | .02            | .00            | ---            | .04            | .22            | .07             | .33             | .08             | .23             | .14             | .16             | -.21            | -.08            | -.08            | .09             | .11             | .16             | .19  |
| Perceived Cause of Erosion         | X <sub>7</sub>  | .10            | .00            | -.08           | .12            | .13            | .00            | .03            | .04            | ---            | .11            | .17             | .03             | .03             | .13             | .05             | .22             | .00             | -.06            | -.08            | .11             | -.02            | -.21            | .19  |
| Total Acres Operated               | X <sub>8</sub>  | .13            | .16            | .08            | .20            | .20            | .02            | -.06           | .12            | .00            | ---            | .15             | .65             | -.05            | .54             | .35             | .36             | -.37            | .13             | .12             | -.05            | .00             | .27             | .29  |
| Tenure                             | X <sub>9</sub>  | .10            | .13            | -.03           | .01            | .01            | .10            | .40            | .14            | .03            | -.03           | ---             | .07             | .06             | .12             | .08             | -.20            | .18             | -.12            | -.01            | -.08            | .07             | .03             | .06  |
| Gross Farm Income                  | X <sub>10</sub> | .13            | -.01           | .06            | .17            | .34            | .13            | -.09           | .14            | -.06           | .63            | .11             | ---             | .09             | .39             | .20             | .50             | -.24            | -.04            | -.14            | .16             | .08             | .21             | .16  |
| Gross Non-Farm Income              | X <sub>11</sub> | -.01           | -.14           | .07            | -.02           | .00            | .20            | -.15           | -.16           | -.11           | -.22           | .00             | -.32            | ---             | .05             | .38             | .13             | -.12            | -.19            | .08             | -.05            | .14             | .55             | .03  |
| Farm Organization Type             | X <sub>12</sub> | .07            | -.05           | -.03           | -.03           | -.02           | .15            | .01            | .06            | .06            | .39            | .22             | .40             | -.06            | ---             | .31             | .17             | -.11            | -.03            | -.03            | .06             | -.02            | .06             | .26  |
| Hired Labor                        | X <sub>13</sub> | .16            | .09            | .12            | .02            | .21            | .06            | -.06           | .16            | -.08           | .51            | .00             | .42             | .00             | .34             | ---             | .19             | -.14            | .02             | .15             | -.05            | .09             | .44             | .17  |
| Use of Credit                      | X <sub>14</sub> | .30            | .28            | .16            | .21            | .40            | .33            | -.28           | .07            | -.21           | .31            | .00             | .26             | .29             | .00             | .17             | ---             | .14             | -.18            | -.12            | .01             | .21             | .23             | .17  |
| Land Use Intensity                 | X <sub>15</sub> | .19            | .03            | .00            | -.11           | -.26           | -.13           | -.04           | -.23           | .15            | -.29           | .30             | .26             | .08             | .00             | .17             | .09             | ---             | .15             | -.34            | .35             | -.05            | -.22            | .01  |
| Average Soil Erosion Rate          | Y <sub>16</sub> | -.28           | .04            | .00            | .04            | .06            | .03            | -.10           | .09            | .00            | -.02           | .20             | .09             | .01             | -.02            | .11             | .06             | .20             | ---             | .62             | .51             | -.13            | -.06            | .15  |
| Average Erosion Potential          | X <sub>17</sub> | .11            | .26            | -.07           | .00            | .23            | .05            | .07            | -.10           | -.02           | .44            | .00             | .23             | -.12            | .02             | .41             | .13             | .34             | .31             | ---             | .75             | .02             | .17             | .15  |
| Corn Suitability Factor            | X <sub>18</sub> | -.22           | -.41           | -.01           | -.14           | -.11           | -.02           | -.01           | -.14           | .03            | -.29           | .01             | -.04            | .08             | .07             | -.16            | .20             | .25             | -.26            | .70             | ---             | .08             | -.19            | -.03 |
| Agency Contacts                    | X <sub>19</sub> | .55            | .09            | .12            | -.07           | .16            | .18            | -.14           | .15            | .08            | .08            | .15             | .20             | -.05            | .36             | .36             | .08             | .00             | -.16            | .02             | .00             | ---             | .25             | -.03 |
| Proportion of Cost Share Practices | X <sub>20</sub> | .00            | .27            | .02            | -.10           | .03            | -.03           | .07            | .13            | .05            | .08            | .10             | .02             | -.07            | -.05            | -.05            | -.06            | -.13            | .02             | .15             | -.04            | .00             | ---             | .09  |
| SCS Conservation Plan              | X <sub>21</sub> | .22            | .41            | .08            | .00            | .20            | .19            | .02            | .18            | .12            | .19            | .35             | .12             | -.02            | .17             | .25             | .17             | -.07            | -.24            | .18             | -.14            | .21             | .14             | ---  |

\* .05 level of significance

presented in Tables 11-15. The criterion for the inclusion of the independent variables in the reduced models was an F-value for each independent variable significant at  $p = .10$ .

Of the seven personal and socioeconomic characteristics that were included in the basic model, only two were retained for the reduced model -- risk propensity and stewardship (Table 11). The two variables on awareness of soil erosion and water quality problems were not significant, and neither was the perceived cause of the problems. This is surprising because another study of farmers in central Iowa found that use of conservation tillage was related to awareness of an erosion problem (Korsching and Nowak, 1983). Another unexpected finding is that education and experience were not significantly related to BMP usage or average crop residue on fields, particularly in the experimental watershed. Miranowski et al. (1982) found that there was a significant, positive relationship between amount of education and experience and the probability of adopting conservation tillage practices in the control (Four Mile Creek) watershed. This difference in findings, however, may be explained in part by the difference in measuring conservation tillage. Miranowski et al. (1982) measured conservation tillage by whether or not the farmer used moldboard plowing, whereas the measurements in this research are much more discriminatory both in BMP usage and the effectiveness of the conservation tillage.

More of the farm firm characteristics than the personal and socioeconomic characteristics were significantly related to BMP usage and average crop residue and thus retained for the reduced model (Table 12). Tenure, gross farm income, gross non-farm income, use of credit and land use intensity were all significant. Size of the farm in acres, farm organization type and use of hired labor were not significant. Miranowski et al. (1982) found a significant



TABLE 11: Regression Equations for Personal and Socioeconomic Characteristics<sup>1</sup>

Experimental

$$Y_1 = .029X_1 - .009X_2 - .009X_3 - .098X_4 - .038X_5 + \underline{.361X_6} - .075X_7$$

( $R^2 = .130$ ;  $F = 1.000$  with  $dF = 7, 47$ )

$$Y_2 = .085X_1 + .010X_2 + .143X_3 - .071X_4 - .064X_5 + .237X_6 - .061X_7$$

( $R^2 = .100$ ;  $F = .720$  with  $dF = 7, 47$ )

Control

$$Y_1 = -.001X_1 - .038X_2 + \underline{.305X_3} + .070X_4 - .105X_5 + \underline{.196X_6} + .081X_7$$

( $R^2 = .191$ ;  $F = 2.761$  with  $dF = 7, 82$ )

$$Y_2 = -.065X_1 - .013X_2 + .162X_3 + .046X_4 - .012X_5 + \underline{.174X_6} - .014X_7$$

( $R^2 = .066$ ;  $F = .822$  with  $dF = 7, 82$ )

1. Underlined standardized coefficients (betas) had F-values significant at  $p = .10$  and were entered into a reduced model.

DEPENDENT VARIABLES

$Y_1$  = Average Crop Residue

$Y_2$  = BMP Index

INDEPENDENT VARIABLES

$X_1$  = Awareness of Soil Erosion Problems

$X_2$  = Awareness of Water Quality Problems

$X_3$  = Risk

$X_4$  = Education

$X_5$  = Experience

$X_6$  = Stewardship

$X_7$  = Perceived Cause

TABLE 12: Regression Equations for Farm Firm Characteristics<sup>1</sup>

Experimental

$$Y_1 = -.105X_8 + \underline{.267X_9} + \underline{.345X_{10}} + .194X_{11} + .023X_{12} + .004X_{13} + .163X_{14} + .116X_{15}$$

$$(R^2 = .252; F = 1.938 \text{ with } dF = 8, 46)$$

$$Y_2 = .050X_8 + .082X_9 - \underline{.384X_{10}} + .067X_{11} + .016X_{12} + .103X_{13} + \underline{.352X_{14}} - \underline{.443X_{15}}$$

$$(R^2 = .345; F = 3.025 \text{ with } dF = 8, 46)$$

Control

$$Y_1 = -.111X_8 + .091X_9 - .089X_{10} - .152X_{11} + .080X_{12} + .138X_{13} + \underline{.368X_{14}} - \underline{.181X_{15}}$$

$$(R^2 = .160; F = 1.922 \text{ with } dF = 8, 81)$$

$$Y_2 = .211X_8 + \underline{.207X_9} - \underline{.384X_{10}} - \underline{.353X_{11}} - .088X_{12} + .112X_{13} + \underline{.407X_{14}} + .076X_{15}$$

$$(R^2 = .252; F = 3.405 \text{ with } dF = 8, 81)$$

1. Underlined standardized coefficients (betas) had F-value significant at  $p = .10$  and were entered into a reduced model.

| DEPENDENT VARIABLES          | INDEPENDENT VARIABLES             |
|------------------------------|-----------------------------------|
| $Y_1$ = Average Crop Residue | $X_8$ = Total Acres               |
| $Y_2$ = BMP Index            | $X_9$ = Tenure                    |
|                              | $X_{10}$ = Gross Farm Income      |
|                              | $X_{11}$ = Gross Non-Farm Income  |
|                              | $X_{12}$ = Farm Organization Type |
|                              | $X_{13}$ = Hired Labor            |
|                              | $X_{14}$ = Use of Credit          |
|                              | $X_{15}$ = Land Use Intensity     |

negative relationship between farm size and the adoption of conservation tillage in the experimental watershed.

Table 13 indicates that the average soil erosion rate and the corn suitability factor are both significantly related to average crop residue and BMP usage, but average erosion potential is not significantly related. Miranowski et al. (1982) found that potential erosivity was highly related to the adoption of conservation tillage. Again, this may be due to differences in the measurement of conservation tillage, or in the differences in measurement of erosion potential of the land. Miranowski et al. (1982) merely classified the land as being either hilly or flat, whereas this research used the more sophisticated RKLS factors of the Universal Soil Loss Equation, which includes rainfall, soil erodibility, slope length and slope gradient. An additional factor that may be reducing the effect of average erosion potential is the possibility of multicollinearity between average erosion potential and the corn suitability factor. Although the correlation coefficients between the two variables are very high,  $-.75$  for the experimental watershed and  $-.70$  for the control watersheds, they are, however, below the commonly accepted standard of  $.80$ .

Finally, all three of the institutional factors were significantly related to one or both of the dependent variables in one or both of the research areas as indicated in Table 14.

Of the original 21 independent variables, 12 had sufficient statistical significance to be included in the reduced models. To estimate the reduced models for each dependent variable, six new multiple regression equations were developed. For the analysis, hierarchical inclusion was employed in a stepwise procedure that introduced the significant land ecological factors first followed by the other significant independent variables. Land ecological

TABLE 13: Regression Equations for Land Ecological Factors<sup>1</sup>

Experimental

$$Y^1 = \underline{-.339}X_{16} + .146X_{17} + .092X_{18}$$

(R<sup>2</sup> = .094; F = 1.764 with dF = 3, 51)

$$Y^2 = -.263X_{16} + .022X_{17} - \underline{.362}X_{18}$$

(R<sup>2</sup> = .108; F = 2.062 with dF = 3, 51)

Control

$$Y^1 = \underline{-.375}X_{16} - .004X_{17} - \underline{.330}X_{18}$$

(R<sup>2</sup> = .184; F = 6.438 with dF = 3, 86)

$$Y^2 = -.069X_{16} - .025X_{17} - \underline{.500}X_{18}$$

(R<sup>2</sup> = .177; F = 6.155 with dF = 3, 86)

1. Underlined standardized coefficients (betas) had F-values significant at p = .10 and were entered into a reduced model.

DEPENDENT VARIABLES

Y<sub>1</sub> = Average Crop Residue

Y<sub>2</sub> = BMP Index

INDEPENDENT VARIABLES

X<sub>16</sub> = Average Soil Erosion Rate

X<sub>17</sub> = Average Erosion Potential

X<sub>18</sub> = Corn Suitability Factor

TABLE 14. Regression Equations for Institutional Factors<sup>1</sup>

Experimental

$$Y_1 = .077X_{19} + \underline{.280X_{20}} + \underline{.246X_{21}}$$

( $R^2 = .167$ ;  $F = 3.416$  with  $df = 3, 51$ )

$$Y_2 = \underline{.324X_{19}} + \underline{.318X_{20}} + \underline{.100X_{21}}$$

( $R^2 = .271$ ;  $F = 6.328$  with  $df = 3, 51$ )

Control

$$Y_1 = \underline{.529X_{19}} - .028X_{20} + .118X_{21}$$

( $R^2 = .320$ ;  $F = 13.505$  with  $df = 3, 86$ )

$$Y_2 = .019X_{19} + \underline{.223X_{20}} + \underline{.374X_{21}}$$

( $R^2 = .218$ ;  $F = 7.989$  with  $df = 3, 86$ )

1. Underlined standardized coefficients (betas) had F-values significant at  $p = .10$  and were entered into a reduced model.

DEPENDENT VARIABLES

$Y_1$  = Crop Residue

$Y_2$  = BMP Index

INDEPENDENT VARIABLES

$X_{19}$  = Agency Contacts

$X_{20}$  = Proportion of Cost Shared Practices

$X_{21}$  = SCS Conservation Plan



factors were entered first because they are largely predetermined and invariable for a specific plot of land. Discussion of the results is presented below for each dependent variable by experimental and control watersheds and the equations are presented in Table 15.

#### AVERAGE CROP RESIDUE

The average amount of crop residue on the soil surface is an important factor affecting erosion rates and water quality. Those farmers who practice conservation tillage leave more crop residue and are likely to have greater erosion control. The average amount of crop residue is thought to be a more precise indicator of BMP use based on reduced tillage systems than is a simple designation of the primary tillage tool.

#### Experimental Watershed

The six variables in the reduced regression model account for 34.1 percent of the variance in average crop residue cover. Of the six variables three attained the selected significance level. In order of decreasing importance they are: proportion of cost-shared practices ( $X_{20}$ ), tenure ( $X_9$ ) and average annual soil erosion rate ( $X_{16}$ ). The relationships of these variables to average crop residue are positive, except for average annual erosion rate. Given that farmers tend to underestimate their soil erosion problems and that the use of conservation practices is to some degree related to problem awareness (Korsching and Nowak, 1983), this negative relationship with average erosion rate is not an unexpected result. The positive relationship with tenure indicates that farmers who own a larger proportion of the land they operate are generally maintaining more crop residue.

One institutional factor has an important influence on average crop residue cover. Farmers who have received cost-sharing for a greater proportion

of the conservation practices they have adopted are generally maintaining a higher average crop residue cover. This may be due to the educational process that occurs through interaction with conservation agencies in the process of obtaining cost-sharing funds. It may also be that conservation tillage which incorporates leaving crop residue on the surface is included in the SCS conservation plan, a plan that is necessary to be eligible for cost-sharing funds. The lack of significance for the SCS conservation plan and the low correlation between the SCS plan and cost-sharing funds, however, would belie that logic.

#### Control Watersheds

The six variables in the reduced regression model for the control watersheds account for 52.7 percent of the variance in average crop residue cover. The coefficients for all the variables except stewardship were significant. These five variables in decreasing order of importance are: agency contacts ( $X_{19}$ ), average soil erosion rate ( $X_{16}$ ), corn suitability rating ( $X_{18}$ ), risk ( $X_3$ ) and past use of credit ( $X_{14}$ ).

Risk propensity is positively related to the average crop residue that a farmer maintains. Farmers who are more willing to take risks are more likely to maintain a higher average crop residue.

Past reliance on credit is significantly related to average crop residue. Farmers who have relied on credit to a greater extent in the past are maintaining a higher average crop residue cover.

The two ecological factors are negatively related to average residue cover. Farmers in the control watersheds with a higher average soil erosion rate are maintaining less average crop residue perhaps for the same reason as in the experimental watershed. Also farmers who operate land with a higher

TABLE 15: Regression Equations for Reduced Models

Experimental

$$Y_1 = .188X_6 + .213X_9 + .174X_{10} - .208X_{16} + .221X_{20} + .138X_{21}$$

( $R^2 = .341$ ;  $F = 4.135$  with  $df = 6, 48$ )

$$Y_2 = -.369X_{10} + .255X_{14} - .420X_{15} + .035X_{18} + .286X_{19} + .271X_{20}$$

( $R^2 = .484$ ;  $F = 7.492$  with  $df = 6, 48$ )

Control

$$Y_1 = .218X_3 + .060X_6 + .145X_{14} - .299X_{16} - .244X_{18} + .448X_{19}$$

( $R^2 = .527$ ;  $F = 15.423$  with  $df = 6, 83$ )

$$Y_2 = .332X_{14} - .244X_{10} - .277X_{11} - .278X_{18} + .228X_{20} + .304X_{21}$$

( $R^2 = .441$ ;  $F = 10.905$  with  $df = 6, 83$ )

1. Underlined standardized coefficients (betas) had F-values significant at  $p = .10$  or greater.

DEPENDENT VARIABLES

$Y_1$  = Average Crop Residue

$Y_2$  = BMP Index

INDEPENDENT VARIABLES

Personal Factors

$X_3$  = Risk

$X_6$  = Stewardship

Farm Firm Characteristics

$X_9$  = Tenure

$X_{10}$  = Gross Farm Income

$X_{11}$  = Gross Non-Farm Income

$X_{14}$  = Use of Credit

$X_{15}$  = Land Use Intensity

Ecological Factors

$X_{16}$  = Average Soil Erosion Rate

$X_{18}$  = Corn Suitability Factor

Institutional Factors

$X_{19}$  = Agency Contacts

$X_{20}$  = Proportion of Cost Shared Practices

$X_{21}$  = SCS Conservation Plan

corn suitability rating are maintaining less average crop residue. This is consistent because the corn suitability rating incorporates slope as one factor. More level ground receives higher ratings and has a lesser need for crop residue cover.

The institutional factor--number of agency contacts--is positively related to average crop residue cover. Farmers who have a greater number of agency contacts maintain a higher average crop residue. This may reflect the fact that greater information requirements are associated with maintaining more complex tillage system, and that greater awareness of and education about the problem and its solution occurs through increased agency contacts.

Finally, as in the experimental watershed, the other personal factor, stewardship ( $X_6$ ), was not significant. If farmers feel they have a moral obligation for conserving the soil, it does not manifest itself in overt conservation behavior.

#### BMP INDEX

Contour planting, strip cropping, sod waterways and filter strips are the items that were incorporated into the best management practices scale. These were selected over others because of their nearly universal application to row crop fields in the three watersheds included in this research. Other practices, such as terracing, were not included because they require more specialized conditions for implementation, conditions which would apply to only about one third of the farms in each watershed.

#### Experimental Watershed

The six variables in the reduced regression model account for forty-eight percent of the variance in the number of BMPs used by farmers in the

experimental watershed. The five significant variables in decreasing order of importance are: land use intensity ( $X_{15}$ ), gross farm income ( $X_{10}$ ), agency contacts ( $X_{19}$ ), proportion of cost-shared practices ( $X_{20}$ ), and use of credit ( $X_{14}$ ). The relationship of land use intensity and farm income to the number of practices used was negative. All other variables were positively related.

Personal factors played no significant role in the number of BMPs and were eliminated in the first stage. Farm firm characteristics offered more explanatory power. As farm income increases and land use intensity increases; the number of BMPs that are used decreases. As reliance on credit increases, however, the number of BMPs adopted also increases. The relationships of the variables land use intensity and reliance on credit with number of BMPs adopted is consistent with past research and expectations. The use of credit facilities BMP implementation. By its nature, intensive land use restricts BMP implementation. The negative relationship between gross farm income and number of BMPs adopted, however, was neither anticipated nor is it consistent with the literature. But it is consistent with the findings Miranowski et al. (1982) in the same experimental watershed. It could be attributed to the additional cost-sharing funds that were made available to the farmers in this watershed, but gross farm income is also negatively related to BMP adoption in the control watersheds (as discussed below).

The two institutional factors, number of agency contacts and percent of cost-shared practices, contribute significantly to the explanation of the number of BMPs used. As contact with agency personnel increases and as the percent of practices cost-shared increases, so the number of conservation practices also increases.

The corn suitability rating was the only ecological variable that was included in the reduced equation. It was not significant.



### Control Watersheds

All six variables entered into the reduced equation for BMP practice adoption in the contral watersheds had significant coefficients. In decreasing order of importance these six variables are credit use ( $X_{14}$ ), SCS conservation plan ( $X_{21}$ ), corn suitability factor ( $X_{18}$ ), gross non-farm income ( $X_{11}$ ), gross farm income ( $X_{10}$ ) and proportion of cost shared practices ( $X_{20}$ ). These six variables explain 44 percent of the variation in the number of BMPs adopted.

The one new variable not found in the other three reduced equations is gross non-farm income. It has a negative relationship with adoption of BMPs which is unexpected but at least consistent with the other results in this research. The other five variables had all appeared in one or more of the other three reduced equations and the directions of the relationships are all consistent.

## CHAPTER V. SUMMARY AND CONCLUSIONS

This sociological analysis has attempted to identify personal and socioeconomic characteristics, farm firm characteristics, land ecological factors and institutional factors influencing the adoption and maintenance of BMPs. BMP use was measured by the adoption of four practices -- contour planting, strip cropping, sod waterways and filter strips -- and the average amount of crop residue left on the soil surface. A significant proportion of the variance in these indicators of BMP use (between 32 and 54 percent) was explained by variables in the models for both the experimental and control watersheds. The variables which significantly contributed to the explained variation in the dependent variables are presented in Table 16.

In examining these factors relative to policy options, some consideration needs to be given to the extent to which the factors can be influenced by different policies. For instance, such factors as the inherent erodibility and the natural fertility (corn suitability rating) of the land are generally beyond the scope and influence of conservation policy. Others, such as tenure and income, could be changed, but not within the present definitions of what is politically and socially acceptable conservation policy. Factors which are classified as modifiable include attitudes such as risk propensity, development and implementation of an SCS conservation plan, amount of agency contacts, use of credit and the intensity of land use. These factors could be altered through existing economic, educational and political policies.

Before beginning a detailed analysis of Table 16 we must again caution the reader that these are cross-sectional results from an experimental design originally created to capture time series data. An important intent of this

Table 16. Variables Affecting BMP Adoption By Experimental Design

| <u>BMP Indicators</u>       | <u>Experimental Watershed</u> | <u>Control Watersheds</u> |
|-----------------------------|-------------------------------|---------------------------|
| Crop Residue<br>(lbs./acre) | Cost sharing fund             | Number of agency contacts |
|                             | Tenure                        | Soil erosion rate         |
|                             | Soil erosion rate             | Corn suitability rating   |
|                             |                               | Risk attitude             |
|                             |                               | Past use of credit        |
| Use of BMPs<br>(1-4 index)  | Land use intensity            | Past use of credit        |
|                             | Farm Income                   | SCS conservation plan     |
|                             | Number of agency contacts     | Corn suitability rating   |
|                             | Cost sharing funds            | Non-farm income           |
|                             | Past use of credit            | Farm income               |
|                             |                               | Cost sharing funds        |

research design was to measure differences in change of conservation behavior over time by the farmers in the three watersheds. The early termination of the project prevented the detailed measurement of the effects of special economic incentives and educational programs in the Four Mile Creek Watershed. Thus there is no way of assessing if the lack of systematic differences in variables explaining adoption behavior between the experimental and control watersheds is due to ineffectiveness of the special economic incentives, the educational programs or some other factor. All that can be stated is that there does seem to be some relationship between certain factors and the adoption of BMPs.

#### Scale of Operations and Conservation Behavior

Arguments have been presented on both sides of the debate concerning the relationship between scale of operations and conservation behavior. Some (Geisler et al, 1980; Boeringa, 1980) have argued that larger operations respond to credit and machinery constraints by maximizing production while ignoring the ecological consequences of this behavior. Others (Timmons and Fisher, 1963; Hoover and Wiitala, 1980; Carlson et al, 1980) have pointed out that the managerial resources associated with larger operations would be more appropriate to the complexities of managing conservation systems. Although these findings will not resolve this debate, they do provide additional insights.

In support of Miranowski et al. (1982), results showed that gross farm income, a measure of operation scale, was inversely related to the adoption of BMPs. Although tenure was also related to the use of BMPs (average crop residue), the most consistent farm firm variable was use of credit. Use of credit was positively related to BMP adoption in both the experimental and control watersheds and to average crop residue in the control watershed.

Availability of credit can be extremely important in controlling soil erosion, especially when "private interest rates are higher than those society would select for long-term investment decisions...and when...farm operators or landlords have time preferences that are shorter than those of society" (Easter and Cotner, 1982).

#### Personal Factors and Conservation Behavior

Personal factors are frequently cited as being important for explaining conservation behavior. Yet the data only provide little support for this argument. Of course it could be argued that the manipulation of the personal factors was part of the proposed experimental design, and thus their true efficacy has yet to be tested. Only one personal factors attained significance in the reduced equations. Conservation tillage can be a fairly complex practice to manage. Accordingly, we find risk propensity directly related to the level of residue maintained in the control watershed.

#### Institutional Support and Conservation Behavior

From the standpoint of agencies working with soil and water conservation, the most positive finding of this research is the strong and consistent relationship between BMP adoption and institutional support. Cost sharing was significant in three of the equations, SCS conservation plan in two of the equations, and contacts with conservation agencies in one equation. All have positive relationships to conservation behavior. Of particular importance is the fact that cost sharing and SCS conservation plan are significant in both the experimental and control watersheds. Although the special treatments in terms of additional financial incentives and educational programs were still limited in the experimental watershed when these data were collected, the



results seem to indicate that even under normal operating conditions institutional support has relatively high efficacy.

#### Policy Implications

Because the experimental research design was not fully implemented, policy implications are limited and drawn with extreme caution. There are, however, some viable policy options related to the institutional mechanisms that promote and support soil and water conservation.

A statement often made by farmers is that soil erosion and water pollution could be controlled if only the incentives were high enough. It is questionable, however, whether society can afford 90 percent cost sharing to promote soil and water conservation as in the experimental watershed. The results from this research indicate that cost sharing is important, but that other institutional factors such as educational programs and technical assistance may be equally important. Therefore, a policy recommendation is to increase the educational programs and technical assistance.

Results from analysis of other data from this research accomplished previously indicate that surprisingly, the majority of farmers do not feel that there is too much government involvement in the areas of soil erosion and water quality (Korsching and Nowak, 1982). In fact, only 13 percent of the farmers stated there was too much government involvement but over two-thirds stated there was too little. If farmers want more government involvement, however, the type of involvement they want is programs that leave the initiative for action up to the individual farmer, such as the current programs of educational programs and economic incentives (Korsching and Nowak, 1982). Also, Korsching et al. (1983) found that the diffusion of conservation tillage through a social system has the same general patterns as other practices and innovations. This

information provides conservation agencies with a proven model -- the adoption/diffusion model (Rogers and Shoemaker, 1971) -- for developing educational and technical assistance programs.

A second policy recommendation would be to increase efforts in developing SCS conservation plans with farmers. Korsching and Nowak (1983) have shown that having a SCS conservation plan makes the farmer more aware of the need for soil and water conservation on his own operation. "The working together of the farmer and the District Conservationist in developing and implementing a conservation plan serves an educational purpose by sensitizing the farmer to erosion problems on his own farm" (Korsching and Nowak, 1983). This research has shown that having an SCS plan increases the use of BMPs. A program of more intense work in conservation plan development for farmers would more formally incorporate; 1) specification of different on- and off-site problems, 2) listing of a range of alternative solutions available, 3) agronomic and engineering characteristics of these alternatives, and 4) economic costs and benefits associated with these alternatives.

The final policy recommendation relates to credit. Although the use of credit was treated as a farm firm characteristic in this research, it is also an institutional factor in that the availability of credit is under institutional control. As the results indicate, past use of credit is positively related to BMP use. This makes the availability of credit a viable policy alternative to direct incentive payments such as cost sharing. The development of a credit system with reasonable interest rates and an allocation system based to some degree on financial need could greatly increase the use of BMPs.

## REFERENCES

- Boeringa, R. (editor)  
1980 Alternative Methods of Agriculture. Agriculture and Environment, Vol. 5.
- Brown, Melvin D. and John D. Highland  
1980 Soil Survey of Benton County, Iowa. United States Department of Agriculture, Soil Conservation Service.
- Carlson, J.E., D.A. Dillman and W. R. Lassey  
1980 The Farmer and Erosion: Factors Influencing the Use of Control Practices. Moscow, ID: Idaho Agricultural Experiment Station Bulletin No. 601.
- Department of Agricultural Engineering  
1980 "The Four Mile Creek research project." Unpublished report. Department of Agricultural Engineering, Iowa State University, Ames, Ia.
- Easter, W. and M. Cotner  
1982 "Evaluation of current alternative strategies." In H. Halcrow, E. Heady and M. Cotner (eds.), Soil Conservation Policies, Institutions and Incentives. Ankeny, IA: Soil Conservation Society of America.
- Geisler, C.C., Cowan, J.T., Hattery, M.R. and Jacobs, H.M.  
1981 "Sustained land consequences of alternative agricultural technologies." Ithaca, NY: Cornell University Department of Rural Sociology, Report No. 119.
- Hoover, H. and M. Wiitala  
1980 Operator and Landlord Participation in Soil Erosion Control in the Maple Creek Watershed in Northeast Nebraska. Washington, D.C.: Economics, Statistics and Cooperatives Service, Staff Report 80-4.
- Johnson, H.P. and J.L. Baker  
1982 Field-to-Stream Transport of Agricultural Chemicals and Sediment in an Iowa Watershed: Part I. Data Base for Model Testing (1976-78). Springfield, VA: National Technical Information Service, PB82-254046.
- 1983 Field-to-Stream Transport of Agricultural Chemicals and Sediment in an Iowa Watershed: Part II. Data Base for Model Testing (1979-1980). Springfield, VA: National Technical Information Service, In Press.

- Korsching, Peter F., Curtis W. Stofferahn, Peter J. Nowak and Donald J. Wagener  
 1983 "Adopter characteristics and adoption patterns of minimum tillage: implications for soil conservation programs." *Journal of Soil and Water Conservation* 38:428-431.
- Korsching, Peter F. and Peter J. Nowak  
 1983 "Soil erosion awareness and use of conservation tillage for water quality control." *Water Resources Bulletin* 19:459-462.
- 1982 "Farmer acceptance of alternative conservation policies." *Agriculture and Environment*, 7:1-14.
- Miranowski, J.A., M.J. Monson, J.S. Shortle, and L.D. Zinser  
 1982 Effect of Agricultural Land Use Practices on Stream Water Quality: Final Report on the Economic Analysis. Ames: Dept. of Economics, Iowa State University. Submitted to Environmental Research Laboratory, E.P.A., Athens, Georgia.
- Moon, Nuriayah N.  
 1982 "Perceived characteristics of the innovation and characteristics of the audience in influencing the adoption of soil conservation practices: a test of the traditional model." Unpublished M.S. thesis. Iowa State University - Ames.
- Rogers, Everett M. and F. Floyd Shoemaker  
 1971 *Communication of Innovations: A Cross Cultural Approach*. New York: Free Press.
- Schermerhorn, Edward J., Lacy I. Harmon, F.F. Riechen and Tom E. Fenton  
 1979 Soil survey of Cedar County, Iowa. United States Department of Agriculture, Soil Conservation Service.
- Timmons, J.F. and L.K. Fischer  
 1963 Appraising your soil conservation district with the help of procedures developed in the Jasper district. Ames, IA: Agriculture and Home Economics Experiment Station Special Report No. 31.
- U.S. Department of Commerce  
 1981 Census of Agriculture, 1978. Volume 1, State and County Data, Part 15, Iowa. Washington, D.C.: U.S. Government Printing Office.

APPENDIX A.

Interview Schedule and Questionnaires



Respondent Contact #1

Personal Interview

February-March  
1980

IOWA STATE UNIVERSITY

of Science and Technology

AMES, IOWA 50011

College of Agriculture  
Experiment Station—Extension Service



ADOPTION OF SOIL CONSERVATION PRACTICES IN IOWA

Hello! I'm \_\_\_\_\_ from the Agricultural Experiment Station in Ames. We are currently conducting a farm survey on soil conservation practices. We hope to use the information to help farmers with their farm operations.

I would like to talk to you about your problems, needs and opinions on soil conservation. Your participation is, of course, completely voluntary, and you may refuse to answer any questions which you feel are too personal, or stop the interview at any time. However, please keep in mind that the success of the study depends on the accuracy and completeness of the information we obtain from you and other farmers.

The information you give will be kept confidential and you will remain anonymous. All information will be for statistical analysis only.

If you have any questions now or during the interview I will be happy to answer them. Again, we appreciate your cooperation.

|                 |       |
|-----------------|-------|
| Respondent ID#: | _____ |
| Date:           | _____ |
| Start Time:     | _____ |
| Appointment:    | _____ |
| Call back: 1st  | _____ |
| 2nd             | _____ |
| 3rd             | _____ |

(respondent ID)

$\frac{1}{(1)}$     $\frac{0}{(5)}$     $\frac{1}{(6)}$   
(2)   (3)   (4)

To begin with, I would like to ask several background questions about you and your farming operation.

- (7)   (8)   1. How many years have you been a farm operator?
- (9)   (10)   2. How many years have you been operating this farm?
- (11)   3. Have the number of acres in your farming operation increased, decreased, or stayed the same?
- Increase = 1  
Decrease = 2  
Same = 3

- (12)   4. Is or was your father a farmer?   Yes = 1   No = 2

If Yes

- (13)   a) Is any part of your father's farm within your present operation?
- Yes = 1   No = 2

If Yes

- (14)   (15)   b) How long has this farm been in the family?

We realize the future is, at best, uncertain; however, we would like to know a little about your farm plans for the future.

- (16)   (17)   5. About how much longer do you plan to continue your current farming operation?   Probe for # of years

- (18)   6. During the next three years do you plan to increase, decrease, or keep the same amount of land in your farming operation?

Increase = 1  
Decrease = 2  
Same = 3

- (19)   (20)   7. How many persons presently live in this household?

- (21)   (22)   8. Of these, how many work at least 150 days per year in the farming operation?

- (23)   (24)   (25)   9. During the past year, approximately how many days, if any, did you work off the farm for pay?

(26)

10. In the next three years, do you plan to increase, decrease, or spend about the same amount of time in off-farm work?

Increase = 1

Decrease = 2

Same = 3

Turn to Card #1

Using this card,

(27)

(28)

11. For the last three years, (1977, 1978, 1979), what was your average gross income from sales of agricultural products, plus custom work and participation in government sponsored agricultural programs. This is your total farm income before taxes and expenses.

You need only respond with the category number.

(29)

(30)

12. For the same period (1977, 1978, & 1979) what was this household's average non-farm income?

Record Category Number

1. None
2. Less than 5,000
3. 5,000 - 9,999
4. 10,000 - 19,999
5. 20,000 - 29,999
6. 30,000 - 39,999
7. 40,000 - 49,999
8. 50,000 - 99,999
9. 100,000 - 149,999
10. 150,000 - 199,999
11. 200,000 - 299,999
12. 300,000 - 399,999
13. Over 400,000

Turn to card #2

(31) 13. In the past, to what degree have you relied on credit to acquire such items as land, machinery, farm buildings and livestock?

Large degree = 1  
Moderate degree = 2  
Small degree = 3  
Not at all = 4

(32) (33) 14. How old were you on your last birthday?

(34) (35) 15. What is the highest grade of school that you have completed?

If 14 or more

a) Do you have any college degrees? Yes = 1 No = 2

(36)

If 14 or more

b) In what areas? to be coded later

(37) (38)

15.c) Have you had any formal technical or vocational training that you use in your farming?

Type of training to be coded later

(39) (40)

(41) (42) 16. Other than American, what do you consider your national background to be?  
To be coded later

Turn to Card #3

(43) 17. Do you consider your political affiliation to be:

- (1) Conservative Republican
- (2) Liberal Republican
- (3) Independent, but closer to Republican
- (4) Independent, but closer to Democrat
- (5) Conservative Democrat
- (6) Liberal Democrat
- (7) Other Specify



(44) (45) 18. What is your present religious preference? Protestant, Jewish, Catholic, or Other?

Protestant Specify denomination for later coding

(20) Jewish

(30) Catholic

Other Specify for later coding

I realize that operating your farm requires many decisions about various farm practices. The next set of questions addresses itself to these various practices and how they are working or might work for you.

(46) 19. a) In recent years there has been discussion of a new approach for controlling crop diseases, weeds and insects. This approach is called "Integrated Pest Management" or "IPM". Do you recall reading or hearing anything about IPM?

Yes = 1 No = 2

If Yes

(47) (48) b) As you understand it, what does Integrated Pest Management involve?

(49) 20. Have you ever obtained detailed information about the possibility of using IPM in your farm operation?

Yes = 1 No = 2

Place sorting sheet before respondent, and hand respondent deck of Practice Cards

Here is a set of cards describing various soil, water, and energy conservation practices. Would you please go through the cards and sort them into three piles--those practices that you are currently using, those practices that you have used in the past but are not currently using, and those practices that you have never used.

First, concerning those practices that you are currently using:

21. What year did you first use (specify) ? Ask for each practice in "Currently Using" pile

| Year                                                     | Year                                                            |
|----------------------------------------------------------|-----------------------------------------------------------------|
| 1. Contour Planting (50) _____ (51) _____                | 8. Permanent Pasture (64) _____ (65) _____                      |
| 2. Strip Cropping (52) _____ (53) _____                  | 9. Sod Waterways (66) _____ (67) _____                          |
| 3. Terracing (54) _____ (55) _____                       | 10. Filter Strips (68) _____ (69) _____                         |
| 4. Sediment Retention Basins (56) _____ (57) _____       | 11. IPM (70) _____ (71) _____                                   |
| 5. Animal Waste Control Structures (58) _____ (59) _____ | 12. Wind Energy Devices, Windmills (72) _____ (73) _____        |
| 6. Minimum Tillage (60) _____ (61) _____                 | 13. Ethanol or Methane Production Systems (74) _____ (75) _____ |
| 7. No Tillage (62) _____ (63) _____                      | 14. Solar Energy (76) _____ (77) _____                          |

\* \* \* END OF CARD ONE \* \* \*

(Respondent ID)

$\frac{1}{(1)}$      $\frac{2}{(2)}$      $\frac{3}{(3)}$      $\frac{4}{(4)}$      $\frac{0}{(5)}$      $\frac{2}{(6)}$

22. Have you received any cost sharing funds for using (specify) ?

Repeat for same practices as in #21

Yes = 1    No = 2

Yes = 1    No = 2

|                                               |                                                      |
|-----------------------------------------------|------------------------------------------------------|
| 1. Contour Planting (7) _____                 | 8. Permanent Pasture (14) _____                      |
| 2. Strip Cropping (8) _____                   | 9. Sod Waterways (15) _____                          |
| 3. Terracing (9) _____                        | 10. Filter Strips (16) _____                         |
| 4. Sediment Retention Basins (10) _____       | 11. IPM (17) _____                                   |
| 5. Animal Waste Control Structures (11) _____ | 12. Wind Energy Devices, Windmills (18) _____        |
| 6. Minimum Tillage (12) _____                 | 13. Ethanol or Methane Production Systems (19) _____ |
| 7. No Tillage (13) _____                      | 14. Solar Energy (20) _____                          |

Turn to card #4

23. What are the costs for using (specify) on your farm:

Refer respondent to answer categories on card #4

- |                                              |                                                          |      |
|----------------------------------------------|----------------------------------------------------------|------|
| 1. Contour Planting (21)_____                | (22) 8. Permanent Pasture (35)_____                      | (36) |
| 2. Strip Cropping (23)_____                  | (24) 9. Sod Waterways (37)_____                          | (38) |
| 3. Terracing (25)_____                       | (26) 10. Filter Strips (39)_____                         | (40) |
| 4. Sediment Retention Basins (27)_____       | 11. IPM (41)_____                                        | (42) |
| 5. Animal Waste Control Structures (29)_____ | (28) 12. Wind Energy Devices, Windmills (43)_____        | (44) |
| 6. Minimum Tillage (31)_____                 | (30) 13. Ethanol or Methane Production Systems (45)_____ | (46) |
| 7. No Tillage (33)_____                      | (32) 14. Solar Energy (47)_____                          | (48) |
|                                              | (34)                                                     |      |

Turn to card #5

24. How profitable is the use of (specify) in your farm operation?

- |                                              |                                                          |      |
|----------------------------------------------|----------------------------------------------------------|------|
| 1. Contour Planting (49)_____                | (50) 8. Permanent Pasture (63)_____                      | (64) |
| 2. Strip Cropping (51)_____                  | (52) 9. Sod Waterways (65)_____                          | (66) |
| 3. Terracing (53)_____                       | (54) 10. Filter Strips (67)_____                         | (68) |
| 4. Sediment Retention Basins (55)_____       | 11. IPM (69)_____                                        | (70) |
| 5. Animal Waste Control Structures (57)_____ | (56) 12. Wind Energy Devices, Windmills (71)_____        | (72) |
| 6. Minimum Tillage (59)_____                 | (58) 13. Ethanol or Methane Production Systems (73)_____ | (74) |
| 7. No Tillage (61)_____                      | (60) 14. Solar Energy (75)_____                          | (76) |
|                                              | (62)                                                     |      |

\*\*\* END OF CARD TWO \*\*\*

(Respondent ID)

Turn to card #6

$\frac{1}{(1)}$     $\frac{2}{(2)}$     $\frac{3}{(3)}$     $\frac{4}{(4)}$     $\frac{0}{(5)}$     $\frac{3}{(6)}$

25. How does your use of (specify) affect time and labor?

- |                                              |                                                          |      |
|----------------------------------------------|----------------------------------------------------------|------|
| 1. Contour Planting ( 7)_____                | ( 8) 8. Permanent Pasture (21)_____                      | (22) |
| 2. Strip Cropping ( 9)_____                  | (10) 9. Sod Waterways (23)_____                          | (24) |
| 3. Terracing (11)_____                       | (12) 10. Filter Strips (25)_____                         | (26) |
| 4. Sediment Retention Basins (13)_____       | 11. IPM (27)_____                                        | (28) |
| 5. Animal Waste Control Structures (15)_____ | (14) 12. Wind Energy Devices, Windmills (29)_____        | (30) |
| 6. Minimum Tillage (17)_____                 | (16) 13. Ethanol or Methane Production Systems (31)_____ | (32) |
| 7. No Tillage (19)_____                      | (18) 14. Solar Energy (33)_____                          | (34) |
|                                              | (20)                                                     |      |

Turn to card #7

26. How difficult or easy is (specify) to use?

- |                                              |                                                          |      |
|----------------------------------------------|----------------------------------------------------------|------|
| 1. Contour Planting (35)_____                | (36) 8. Permanent Pasture (49)_____                      | (50) |
| 2. Strip Cropping (37)_____                  | (38) 9. Sod Waterways (51)_____                          | (52) |
| 3. Terracing (39)_____                       | (40) 10. Filter Strips (53)_____                         | (54) |
| 4. Sediment Retention Basins (41)_____       | 11. IPM (55)_____                                        | (56) |
| 5. Animal Waste Control Structures (43)_____ | (42) 12. Wind Energy Devices, Windmills (57)_____        | (58) |
| 6. Minimum Tillage (45)_____                 | (44) 13. Ethanol or Methane Production Systems (59)_____ | (60) |
| 7. No Tillage (47)_____                      | (46) 14. Solar Energy (61)_____                          | (62) |
|                                              | (48)                                                     |      |

\*\*\* END OF CARD THREE \*\*\*

(Respondent ID)

Turn to card #8

$\frac{1}{(1)}$   $\frac{2}{(2)}$   $\frac{3}{(3)}$   $\frac{4}{(4)}$   $\frac{0}{(5)}$   $\frac{4}{(6)}$

27. How compatible is (specify) with your operation?

- |                                              |                                                          |      |
|----------------------------------------------|----------------------------------------------------------|------|
| 1. Contour Planting ( 7)_____                | ( 8) 3. Permanent Pasture (21)_____                      | (22) |
| 2. Strip Cropping ( 9)_____                  | (10) 9. Sod Waterways (23)_____                          | (24) |
| 3. Terracing (11)_____                       | (12) 10. Filter Strips (25)_____                         | (26) |
| 4. Sediment Retention Basins (13)_____       | 11. IPM (27)_____                                        | (28) |
| 5. Animal Waste Control Structures (15)_____ | (14) 12. Wind Energy Devices, Windmills (29)_____        | (30) |
| 6. Minimum Tillage (17)_____                 | (16) 13. Ethanol or Methane Production Systems (31)_____ | (32) |
| 7. No Tillage (19)_____                      | (18) 14. Solar Energy (33)_____                          | (34) |
|                                              | (20)                                                     |      |

Turn to card #9

28. To what extent do you feel your use of (specify) has influenced the water quality in (specify) creek?

- |                                              |                                     |      |
|----------------------------------------------|-------------------------------------|------|
| 1. Contour Planting (35)_____                | (36) 8. Permanent Pasture (49)_____ | (50) |
| 2. Strip Cropping (37)_____                  | (38) 9. Sod Waterways (51)_____     | (52) |
| 3. Terracing (39)_____                       | (40) 10. Filter Strips (53)_____    | (54) |
| 4. Sediment Retention Basins (41)_____       | 11. IPM (55)_____                   | (56) |
| 5. Animal Waste Control Structures (43)_____ | (42)                                |      |
| 6. Minimum Tillage (45)_____                 | (44)                                |      |
| 7. No Tillage (47)_____                      | (46)                                |      |
|                                              | (48)                                |      |

Turn to card #10

29. How has your use of (specify) influenced soil erosion?

- |                                              |            |                                                     |            |
|----------------------------------------------|------------|-----------------------------------------------------|------------|
| 1. Contour Planting (57) _____               | (58) _____ | 8. Permanent Pasture(71) _____                      | (72) _____ |
| 2. Strip Cropping (59) _____                 | (60) _____ | 9. Sod Waterways (73) _____                         | (74) _____ |
| 3. Terracing (61) _____                      | (62) _____ | 10. Filter Strips (75) _____                        | (76) _____ |
| 4. Sediment Retention Basins (63) _____      | (64) _____ | 11. IPM (77) _____                                  | (78) _____ |
| 5. Animal Waste Control Structures(65) _____ | (66) _____ | 13. Ethanol or Methane Production Systems(79) _____ | (80) _____ |
| 6. Minimum Tillage (67) _____                | (68) _____ |                                                     |            |
| 7. No Tillage (69) _____                     | (70) _____ |                                                     |            |

\*\*\* END OF CARD FOUR \*\*\*

(Respondent ID)

Turn to card #11

$\frac{1}{(1)}$   $\frac{2}{(2)}$   $\frac{3}{(3)}$   $\frac{4}{(4)}$   $\frac{0}{(5)}$   $\frac{5}{(6)}$

30. How does your use of (specify) affect energy consumption?

- |                                              |            |                                                     |            |
|----------------------------------------------|------------|-----------------------------------------------------|------------|
| 1. Contour Planting ( 7) _____               | ( 8) _____ | 8. Permanent Pasture(21) _____                      | (22) _____ |
| 2. Strip Cropping ( 9) _____                 | (10) _____ | 9. Sod Waterways (23) _____                         | (24) _____ |
| 3. Terracing (11) _____                      | (12) _____ | 10. Filter Strips (25) _____                        | (26) _____ |
| 4. Sediment Retention Basins (13) _____      | (14) _____ | 11. IPM (27) _____                                  | (28) _____ |
| 5. Animal Waste Control Structures(15) _____ | (16) _____ | 12. Wind Energy Devices, Windmills(29) _____        | (30) _____ |
| 6. Minimum Tillage (17) _____                | (18) _____ | 13. Ethanol or Methane Production Systems(31) _____ | (32) _____ |
| 7. No Tillage (19) _____                     | (20) _____ | 14. Solar Energy (33) _____                         | (34) _____ |

31. Do you plan to continue to use (specify) ?

If no, probe for reason why and use next page for responses

Yes = 1 No = 2

Yes = 1 No = 2

- |                                               |                                                      |
|-----------------------------------------------|------------------------------------------------------|
| 1. Contour Planting (35) _____                | 8. Permanent Pasture (42) _____                      |
| 2. Strip Cropping (36) _____                  | 9. Sod Waterways (43) _____                          |
| 3. Terracing (37) _____                       | 10. Filter Strips (44) _____                         |
| 4. Sediment Retention Basins (38) _____       | 11. IPM (45) _____                                   |
| 5. Animal Waste Control Structures (39) _____ | 12. Wind Energy Devices, Windmills (46) _____        |
| 6. Minimum Tillage (40) _____                 | 13. Ethanol or Methane Production Systems (47) _____ |
| 7. No Tillage (41) _____                      | 14. Solar Energy (48) _____                          |



Only ask for those practices coded 2 (no) in question 31

31. a. Use "possible category" card to probe if necessary

(49) (50) System number \_\_\_\_\_ (Probe reason for planning to discontinue)

(51) (52)

(53) (54) System number \_\_\_\_\_ (Reason) \_\_\_\_\_

(55) (56)

(57) (58) System number \_\_\_\_\_ (Reason) \_\_\_\_\_

(59) (60)

(61) (62) System number \_\_\_\_\_ (Reason) \_\_\_\_\_

(63) (64)

\*\*\* END OF CARD FIVE \*\*\*

(Respondent ID)

$\frac{1}{(1)}$   $\frac{2}{(2)}$   $\frac{3}{(3)}$   $\frac{4}{(4)}$   $\frac{0}{(5)}$   $\frac{6}{(6)}$

Now I would like to ask about those practices you have used in the past but are no longer using.

Turn to Card #12

32. During the period in which you used (specify), what was its costs:

- |                                           |        |                                                  |        |
|-------------------------------------------|--------|--------------------------------------------------|--------|
| 1. Contour Planting ( 7 )                 | ( 8 )  | 8. Permanent Pasture ( 1 )                       | ( 2 )  |
| 2. Strip Cropping ( 9 )                   | ( 10 ) | 9. Sod Waterways ( 23 )                          | ( 24 ) |
| 3. Terracing ( 11 )                       | ( 12 ) | 10. Filter Strips ( 25 )                         | ( 26 ) |
| 4. Sediment Retention Basins ( 13 )       | ( 14 ) | 11. IPM ( 27 )                                   | ( 28 ) |
| 5. Animal Waste Control Structures ( 15 ) | ( 16 ) | 12. Wind Energy Devices, Windmills ( 29 )        | ( 30 ) |
| 6. Minimum Tillage ( 17 )                 | ( 18 ) | 13. Ethanol or Methane Production Systems ( 31 ) | ( 32 ) |
| 7. No Tillage ( 19 )                      | ( 20 ) | 14. Solar Energy ( 33 )                          | ( 34 ) |

Turn to card #13

33. How profitable was (specify) in your operation?

- |                                           |        |                                                  |        |
|-------------------------------------------|--------|--------------------------------------------------|--------|
| 1. Contour Planting ( 35 )                | ( 36 ) | 8. Permanent Pasture ( 47 )                      | ( 50 ) |
| 2. Strip Cropping ( 37 )                  | ( 38 ) | 9. Sod Waterways ( 51 )                          | ( 52 ) |
| 3. Terracing ( 39 )                       | ( 40 ) | 10. Filter Strips ( 53 )                         | ( 54 ) |
| 4. Sediment Retention Basins ( 41 )       | ( 42 ) | 11. IPM ( 55 )                                   | ( 56 ) |
| 5. Animal Waste Control Structures ( 43 ) | ( 44 ) | 12. Wind Energy Devices, Windmills ( 57 )        | ( 58 ) |
| 6. Minimum Tillage ( 45 )                 | ( 46 ) | 13. Ethanol or Methane Production Systems ( 59 ) | ( 60 ) |
| 7. No Tillage ( 47 )                      | ( 48 ) | 14. Solar Energy ( 61 )                          | ( 62 ) |

\* END OF CARD SIX \* \* \*

(Respondent ID)

Turn to card #14

$\frac{1}{(1)}$   $\frac{2}{(2)}$   $\frac{3}{(3)}$   $\frac{4}{(4)}$   $\frac{5}{(5)}$   $\frac{6}{(6)}$

34. How did the use of (specify) affect your time and labor?

- |                                           |        |                                                  |        |
|-------------------------------------------|--------|--------------------------------------------------|--------|
| 1. Contour Planting ( 7 )                 | ( 8 )  | 8. Permanent Pasture ( 21 )                      | ( 22 ) |
| 2. Strip Cropping ( 9 )                   | ( 10 ) | 9. Sod Waterways ( 23 )                          | ( 24 ) |
| 3. Terracing ( 11 )                       | ( 12 ) | 10. Filter Strips ( 25 )                         | ( 26 ) |
| 4. Sediment Retention Basins ( 13 )       | ( 14 ) | 11. IPM ( 27 )                                   | ( 28 ) |
| 5. Animal Waste Control Structures ( 15 ) | ( 16 ) | 12. Wind Energy Devices, Windmills ( 29 )        | ( 30 ) |
| 6. Minimum Tillage ( 17 )                 | ( 18 ) | 13. Ethanol or Methane Production Systems ( 31 ) | ( 32 ) |
| 7. No Tillage ( 19 )                      | ( 20 ) | 14. Solar Energy ( 33 )                          | ( 34 ) |

**Turn to card #15**

35. How difficult or easy was (specify) to use?

- |                                             |                                                         |      |
|---------------------------------------------|---------------------------------------------------------|------|
| 1. Contour Planting(35)_____                | (36) 8. Permanent Pasture(49)_____                      | (50) |
| 2. Strip Cropping (37)_____                 | (38) 9. Sod Waterways (51)_____                         | (52) |
| 3. Terracing (39)_____                      | (40) 10. Filter Strips (53)_____                        | (54) |
| 4. Sediment Retention Basins(41)_____       | 11. IPM (55)_____                                       | (56) |
| 5. Animal Waste Control Structures(43)_____ | (42) 12. Wind Energy Devices, Windmills(57)_____        | (58) |
| 6. Minimum Tillage (45)_____                | (46) 13. Ethanol or Methane Production Systems(59)_____ | (60) |
| 7. No Tillage (47)_____                     | (48) 14. Solar Energy (61)_____                         | (62) |

\*\*\* END OF CARD SEVEN \*\*\*

(Respondent ID)

**Turn to card #16**

$\frac{1}{(1)}$   $\frac{2}{(2)}$   $\frac{3}{(3)}$   $\frac{4}{(4)}$   $\frac{5}{(5)}$   $\frac{8}{(6)}$

36. How compatible was (specify) with your operation?

- |                                             |                                                         |      |
|---------------------------------------------|---------------------------------------------------------|------|
| 1. Contour Planting ( 7)_____               | ( 8) 8. Permanent Pasture(21)_____                      | (22) |
| 2. Strip Cropping ( 9)_____                 | (10) 9. Sod Waterways (23)_____                         | (24) |
| 3. Terracing (11)_____                      | (12) 10. Filter Strips (25)_____                        | (26) |
| 4. Sediment Retention Basins(13)_____       | 11. IPM (27)_____                                       | (28) |
| 5. Animal Waste Control Structures(15)_____ | (14) 12. Wind Energy Devices, Windmills(29)_____        | (30) |
| 6. Minimum Tillage (17)_____                | (16) 13. Ethanol or Methane Production Systems(31)_____ | (32) |
| 7. No Tillage (19)_____                     | (20) 14. Solar Energy (33)_____                         | (34) |

**Turn to card #17**

37. To what extent do you feel the use of (specify) influenced the water quality in (specify) creek.

- |                                             |                                    |      |
|---------------------------------------------|------------------------------------|------|
| 1. Contour Planting(35)_____                | (36) 8. Permanent Pasture(49)_____ | (50) |
| 2. Strip Cropping (37)_____                 | (38) 9. Sod Waterways (51)_____    | (52) |
| 3. Terracing (39)_____                      | (40) 10. Filter Strips (53)_____   | (54) |
| 4. Sediment Retention Basins(41)_____       | 11. IPM (55)_____                  | (56) |
| 5. Animal Waste Control Structures(43)_____ | (44)                               |      |
| 6. Minimum Tillage (45)_____                | (46)                               |      |
| 7. No Tillage (47)_____                     | (48)                               |      |

\*\*\* END OF CARD EIGHT \*\*\*

(Respondent ID)

Turn to card #18

$\frac{1}{(1)}$   $\frac{2}{(2)}$   $\frac{3}{(3)}$   $\frac{4}{(4)}$   $\frac{0}{(5)}$   $\frac{9}{(6)}$

38. How did your use of (specify) affect energy consumption?

- |                                              |           |                                                     |           |
|----------------------------------------------|-----------|-----------------------------------------------------|-----------|
| 1. Contour Planting ( 7)_____                | ( 8)_____ | 8. Permanent Pasture (21)_____                      | (22)_____ |
| 2. Strip Cropping ( 9)_____                  | (10)_____ | 9. Sod Waterways (23)_____                          | (24)_____ |
| 3. Terracing (11)_____                       | (12)_____ | 10. Filter Strips (25)_____                         | (26)_____ |
| 4. Sediment Retention Basins (13)_____       | (14)_____ | 11. IPM (27)_____                                   | (28)_____ |
| 5. Animal Waste Control Structures (15)_____ | (16)_____ | 12. Wind Energy Devices, Windmills (29)_____        | (30)_____ |
| 6. Minimum Tillage (17)_____                 | (18)_____ | 13. Ethanol or Methane Production Systems (31)_____ | (32)_____ |
| 7. No Tillage (19)_____                      | (20)_____ | 14. Solar Energy (33)_____                          | (34)_____ |

Turn to card #19

39. How did your use of (specify) affect soil erosion on your farm?

- |                                              |           |                                                     |           |
|----------------------------------------------|-----------|-----------------------------------------------------|-----------|
| 1. Contour Planting (35)_____                | (36)_____ | 8. Permanent Pasture (49)_____                      | (50)_____ |
| 2. Strip Cropping (37)_____                  | (38)_____ | 9. Sod Waterways (51)_____                          | (52)_____ |
| 3. Terracing (39)_____                       | (40)_____ | 10. Filter Strips (53)_____                         | (54)_____ |
| 4. Sediment Retention Basins (41)_____       | (42)_____ | 11. IPM (55)_____                                   | (56)_____ |
| 5. Animal Waste Control Structures (43)_____ | (44)_____ | 13. Ethanol or Methane Production Systems (57)_____ | (58)_____ |
| 6. Minimum Tillage (45)_____                 | (46)_____ |                                                     |           |
| 7. No Tillage (47)_____                      | (48)_____ |                                                     |           |

40. Prior to using (specify) did you first test it on a trial basis?

Yes = 1 No = 2

Yes = 1 No = 2

- |                                              |                                                     |
|----------------------------------------------|-----------------------------------------------------|
| 1. Contour Planting (59)_____                | 3. Permanent Pasture (66)_____                      |
| 2. Strip Cropping (60)_____                  | 9. Sod Waterways (67)_____                          |
| 3. Terracing (61)_____                       | 10. Filter Strips (68)_____                         |
| 4. Sediment Retention Basins (62)_____       | 11. IPM (69)_____                                   |
| 5. Animal Waste Control Structures (63)_____ | 12. Wind Energy Devices, Windmills (70)_____        |
| 6. Minimum Tillage (64)_____                 | 13. Ethanol or Methane Production Systems (71)_____ |
| 7. No Tillage (65)_____                      | 14. Solar Energy (72)_____                          |

\*\*\* END OF CARD NINE \*\*\*

(Respondent ID)

$\frac{1}{(1)}$   $\frac{1}{(2)}$   $\frac{1}{(3)}$   $\frac{1}{(4)}$   $\frac{1}{(5)}$   $\frac{0}{(6)}$

41. What made you decide to stop using (specify)?

Use possible category card to probe if necessary

Ask for all practices in "Previously Used" pile

System number \_\_\_\_\_ Probe reason for discontinuance \_\_\_\_\_

(7) (8)

(9) (10)

System number \_\_\_\_\_ Probe reason for discontinuance \_\_\_\_\_

(11) (12)

(13) (14)

System number \_\_\_\_\_ Probe reason for discontinuance \_\_\_\_\_

(15) (16)

(17) (18)

System number \_\_\_\_\_ Probe reason for discontinuance \_\_\_\_\_

(19) (20)

(21) (22)



Finally, I would like to ask your opinions about the systems that you have never used.

Turn to card #20

42. If you were to use (specify), do you think costs would be:

- |                                             |           |                                                    |           |
|---------------------------------------------|-----------|----------------------------------------------------|-----------|
| 1. Contour Planting(23)_____                | (24)_____ | 8. Permanent Pasture(37)_____                      | (38)_____ |
| 2. Strip Cropping (25)_____                 | (26)_____ | 9. Sod Waterways (39)_____                         | (40)_____ |
| 3. Terracing (27)_____                      | (28)_____ | 10. Filter Strips (41)_____                        | (42)_____ |
| 4. Sediment Retention Basins(29)_____       | (30)_____ | 11. IPM (43)_____                                  | (44)_____ |
| 5. Animal Waste Control Structures(31)_____ | (32)_____ | 12. Wind Energy Devices, Windmills(45)_____        | (46)_____ |
| 6. Minimum Tillage (33)_____                | (34)_____ | 13. Ethanol or Methane Production Systems(47)_____ | (48)_____ |
| 7. No Tillage (35)_____                     | (36)_____ | 14. Solar Energy (49)_____                         | (50)_____ |

Turn to card #21

43. How profitable would the use of (specify) be in your farm operation?

- |                                             |           |                                                    |           |
|---------------------------------------------|-----------|----------------------------------------------------|-----------|
| 1. Contour Planting(51)_____                | (52)_____ | 8. Permanent Pasture(65)_____                      | (66)_____ |
| 2. Strip Cropping (53)_____                 | (54)_____ | 9. Sod Waterways (67)_____                         | (68)_____ |
| 3. Terracing (55)_____                      | (56)_____ | 10. Filter Strips (69)_____                        | (70)_____ |
| 4. Sediment Retention Basins(57)_____       | (58)_____ | 11. IPM (71)_____                                  | (72)_____ |
| 5. Animal Waste Control Structures(59)_____ | (60)_____ | 12. Wind Energy Devices, Windmills(73)_____        | (74)_____ |
| 6. Minimum Tillage (61)_____                | (62)_____ | 13. Ethanol or Methane Production Systems(75)_____ | (76)_____ |
| 7. No Tillage (63)_____                     | (64)_____ | 14. Solar Energy (77)_____                         | (78)_____ |

\*\*\* END OF CARD TEN \*\*\*

(Respondent ID)

$\frac{1}{(1)}$     $\frac{1}{(2)}$     $\frac{1}{(3)}$     $\frac{1}{(4)}$     $\frac{1}{(5)}$     $\frac{1}{(6)}$

Turn to card #22

44. If you were to use (specify), how do you think it would affect your time and labor?

- |                                             |           |                                                    |           |
|---------------------------------------------|-----------|----------------------------------------------------|-----------|
| 1. Contour Planting( 7)_____                | ( 8)_____ | 8. Permanent Pasture(21)_____                      | (22)_____ |
| 2. Strip Cropping ( 9)_____                 | (10)_____ | 9. Sod Waterways (23)_____                         | (24)_____ |
| 3. Terracing (11)_____                      | (12)_____ | 10. Filter Strips (25)_____                        | (26)_____ |
| 4. Sediment Retention Basins(13)_____       | (14)_____ | 11. IPM (27)_____                                  | (28)_____ |
| 5. Animal Waste Control Structures(15)_____ | (16)_____ | 12. Wind Energy Devices, Windmills(29)_____        | (30)_____ |
| 6. Minimum Tillage (17)_____                | (18)_____ | 13. Ethanol or Methane Production Systems(31)_____ | (32)_____ |
| 7. No Tillage (19)_____                     | (20)_____ | 14. Solar Energy (33)_____                         | (34)_____ |

Turn to card #23

45. How difficult or easy would (specify) to use?

- |                                              |                                                          |      |
|----------------------------------------------|----------------------------------------------------------|------|
| 1. Contour Planting(35) _____                | (36) 8. Permanent Pasture(49) _____                      | (50) |
| 2. Strip Cropping (37) _____                 | (38) 9. Sod Waterways (51) _____                         | (52) |
| 3. Terracing (39) _____                      | (40) 10. Filter Strips (53) _____                        | (54) |
| 4. Sediment Retention Basins(41) _____       | 11. IPM (55) _____                                       | (56) |
| 5. Animal Waste Control Structures(43) _____ | (42) 12. Wind Energy Devices, Windmills(57) _____        | (58) |
| 6. Minimum Tillage (45) _____                | (44) 13. Ethanol or Methane Production Systems(59) _____ | (60) |
| 7. No Tillage (47) _____                     | (46) 14. Solar Energy (61) _____                         | (62) |
|                                              | (48)                                                     |      |

\*\*\* END OF CARD ELEVEN \*\*\*

(Respondent ID)

$\frac{1}{(1)}$     $\frac{1}{(2)}$     $\frac{1}{(3)}$     $\frac{1}{(4)}$     $\frac{1}{(5)}$     $\frac{2}{(6)}$

Turn to card #24

46. How compatible would (specify) be with your operation?

- |                                              |                                                          |      |
|----------------------------------------------|----------------------------------------------------------|------|
| 1. Contour Planting( 7) _____                | ( 8) 8. Permanent Pasture(21) _____                      | (22) |
| 2. Strip Cropping ( 9) _____                 | (10) 9. Sod Waterways (23) _____                         | (24) |
| 3. Terracing (11) _____                      | (12) 10. Filter Strips (25) _____                        | (26) |
| 4. Sediment Retention Basins(13) _____       | 11. IPM (27) _____                                       | (28) |
| 5. Animal Waste Control Structures(15) _____ | (14) 12. Wind Energy Devices, Windmills(29) _____        | (30) |
| 6. Minimum Tillage (17) _____                | (16) 13. Ethanol or Methane Production Systems(31) _____ | (32) |
| 7. No Tillage (19) _____                     | (18) 14. Solar Energy (33) _____                         | (34) |
|                                              | (20)                                                     |      |

Turn to card #25

47. By using (specify), how do you feel this would influence the water quality here in (specify) creek?

- |                                              |                                     |      |
|----------------------------------------------|-------------------------------------|------|
| 1. Contour Planting (35) _____               | (36) 8. Permanent Pasture(49) _____ | (50) |
| 2. Strip Cropping (37) _____                 | (38) 9. Sod Waterways (51) _____    | (52) |
| 3. Terracing (39) _____                      | (40) 10. Filter Strips (53) _____   | (54) |
| 4. Sediment Retention Basins (41) _____      | 11. IPM (55) _____                  | (56) |
| 5. Animal Waste Control Structures(43) _____ | (42)                                |      |
| 6. Minimum Tillage (45) _____                | (44)                                |      |
| 7. No Tillage (47) _____                     | (46)                                |      |
|                                              | (48)                                |      |

\*\*\* END OF CARD TWELVE \*\*\*

(Respondent ID)

Turn to card #26

$\frac{1}{(1)}$   $\frac{1}{(2)}$   $\frac{1}{(3)}$   $\frac{1}{(4)}$   $\frac{1}{(5)}$   $\frac{3}{(6)}$

48. If you were to use (specify), how do you think it would affect your energy consumption?

- |                                               |                                                           |      |
|-----------------------------------------------|-----------------------------------------------------------|------|
| 1. Contour Planting (7) _____                 | (8) 8. Permanent Pasture (21) _____                       | (22) |
| 2. Strip Cropping (9) _____                   | (10) 9. Sod Waterways (23) _____                          | (24) |
| 3. Terracing (11) _____                       | (12) 10. Filter Strips (25) _____                         | (26) |
| 4. Sediment Retention Basins (13) _____       | 11. IPM (27) _____                                        | (28) |
| 5. Animal Waste Control Structures (15) _____ | (14) 12. Wind Energy Devices, Windmills (29) _____        | (30) |
| 6. Minimum Tillage (17) _____                 | (16) 13. Ethanol or Methane Production Systems (31) _____ | (32) |
| 7. No Tillage (19) _____                      | (18) 14. Solar Energy (33) _____                          | (34) |
|                                               | (20)                                                      |      |

Turn to card #27

49. If you were to use (specify), how do you think its use would influence soil erosion?

- |                                               |                                                           |      |
|-----------------------------------------------|-----------------------------------------------------------|------|
| 1. Contour Planting (35) _____                | (36) 8. Permanent Pasture (49) _____                      | (50) |
| 2. Strip Cropping (37) _____                  | (38) 9. Sod Waterways (51) _____                          | (52) |
| 3. Terracing (39) _____                       | (40) 10. Filter Strips (53) _____                         | (54) |
| 4. Sediment Retention Basins (41) _____       | 11. IPM (55) _____                                        | (56) |
| 5. Animal Waste Control Structures (43) _____ | (42) 13. Ethanol or Methane Production Systems (57) _____ | (58) |
| 6. Minimum Tillage (45) _____                 | (44)                                                      |      |
| 7. No Tillage (47) _____                      | (46)                                                      |      |
|                                               | (48)                                                      |      |

50. Do you think (specify) has any place in your future farming operation?

For all practices checked NO, ask Q 51

Yes = 1 No = 2

Yes = 1 No = 2

- |                                               |                                                      |
|-----------------------------------------------|------------------------------------------------------|
| 1. Contour Planting (59) _____                | 8. Permanent Pasture (66) _____                      |
| 2. Strip Cropping (60) _____                  | 9. Sod Waterways (67) _____                          |
| 3. Terracing (61) _____                       | 10. Filter Strips (68) _____                         |
| 4. Sediment Retention Basins (62) _____       | 11. IPM (69) _____                                   |
| 5. Animal Waste Control Structures (63) _____ | 12. Wind Energy Devices, Windmills (70) _____        |
| 6. Minimum Tillage (64) _____                 | 13. Ethanol or Methane Production Systems (71) _____ |
| 7. No Tillage (65) _____                      | 14. Solar Energy (72) _____                          |

\*\*\* END OF CARD THIRTEEN \*\*\*

(Respondent ID)

$\frac{1}{(1)}$   $\frac{1}{(2)}$   $\frac{1}{(3)}$   $\frac{1}{(4)}$   $\frac{1}{(5)}$   $\frac{4}{(6)}$

51. Why would you not use this system on your farm?

Use "possible categories" sheet to probe if necessary

Ask for all practices checked "no" in Q 50

System number \_\_\_\_\_ Reason for not using \_\_\_\_\_

( 7 ) ( 8 )

( 9 ) (10)

(11) (12)

(13) (14)

(15) (16)

(17) (18)

(19) (20)

(21) (22)

(23) (24)

(25) (26)

Soil erosion and water quality are often viewed differently by different people. I would like to ask you for your opinions on these issues.

Turn to card #28 I would like you to use the responses as listed on this card.

|      |                                                           |            |              |               |              |
|------|-----------------------------------------------------------|------------|--------------|---------------|--------------|
| (27) | 52. Is soil erosion a problem in the <u>Midwest</u> ?     | NOT<br>(1) | SMALL<br>(2) | MEDIUM<br>(3) | MAJOR<br>(4) |
| (28) | 53. Is water quality a problem in the <u>Midwest</u> ?    | NOT<br>(1) | SMALL<br>(2) | MEDIUM<br>(3) | MAJOR<br>(4) |
| (29) | 54. Is soil erosion a problem in <u>Iowa</u> ?            | NOT<br>(1) | SMALL<br>(2) | MEDIUM<br>(3) | MAJOR<br>(4) |
| (30) | 55. Is water quality a problem in <u>Iowa</u> ?           | NOT<br>(1) | SMALL<br>(2) | MEDIUM<br>(3) | MAJOR<br>(4) |
| (31) | 56. Is soil erosion a problem in your <u>community</u> ?  | NOT<br>(1) | SMALL<br>(2) | MEDIUM<br>(3) | MAJOR<br>(4) |
| (32) | 57. Is water quality a problem in your <u>community</u> ? | NOT<br>(1) | SMALL<br>(2) | MEDIUM<br>(3) | MAJOR<br>(4) |
| (33) | 58. Is soil erosion a problem on your <u>farm</u> ?       | NOT<br>(1) | SMALL<br>(2) | MEDIUM<br>(3) | MAJOR<br>(4) |
| (34) | 59. Is water quality a problem on your <u>farm</u> ?      | NOT<br>(1) | SMALL<br>(2) | MEDIUM<br>(3) | MAJOR<br>(4) |

Turn to card #29 Now, using these responses:

(35) 60. In terms of total amounts, which of the following substances do you think contributes the most to water pollution in the U.S.?

- (1) Run-off of pesticides and fertilizers
- (2) Wastes from factories and industry
- (3) Sediments from soil erosion
- (4) Sewage from towns and cities
- (5) Uncertain



Turn to card #30

- (36) 61. Listed below are several possible sources of pollution associated with agriculture. Which do you think causes the greatest amount of water pollution in Iowa?
- (1) Run-off pesticides
  - (2) Animal wastes
  - (3) Run-off of plant fertilizers
  - (4) Sediments from soil erosion
  - (5) Uncertain

Turn to card #31

- (37) 62. Which of the following conditions do you think is most likely to decrease soil erosion?
- (1) Increase organic matter in the soil
  - (2) Higher soil water intake
  - (3) Mulch-tilled fields
  - (4) Uncertain

Turn to card #32

- (38) 63. Which of the following conditions do you think has the most effect on soil erosion?
- (1) Tillage system
  - (2) Rates of fertilizer application
  - (3) Timing of planting
  - (4) Weed control system
  - (5) Uncertain

Turn to card #33

The following is a list of policy areas that are important to farmers at the present time. For each area do you think that there is:

Far too Little Governmental Control  
 Too Little Governmental Control  
 About the Right Amount of Governmental Control  
 Too Much Governmental Control  
 Far Too Much Governmental Control

|      |                                                                        | (1) | (2) | (3) | (4) | (5) |
|------|------------------------------------------------------------------------|-----|-----|-----|-----|-----|
| (39) | 64. Pesticides and their application                                   | FTL | TL  | AR  | TM  | FTM |
| (40) | 65. Soil Conservation (e.g. regulating soil erosion)                   | FTL | TL  | AR  | TM  | FTM |
| (41) | 66. Land Use (e.g. preserving agricultural land)                       | FTL | TL  | AR  | TM  | FTM |
| (42) | 67. Water Quality                                                      | FTL | TL  | AR  | TM  | FTM |
| (43) | 68. Agricultural Production (e.g. set aside or price support programs) | FTL | TL  | AR  | TM  | FTM |

A number of different policies have been proposed to control soil erosion. How acceptable would each of the following policies be, to you, for controlling soil erosion?

Turn to card #34

- (44) (45) 69. Economic incentives such as cost sharing, low-interest loans, tax credits, etc.
- (46) (47) 70. Economic penalties such as taxes on excessive soil loss, ineligibility for parity payments, and ineligibility for low interest loans.
- (48) (49) 71. Legal regulations such as soil loss limits, and prohibiting moldboard or conventional plowing.
- (50) (51) 72. Educational programs such as field days, informational meetings, short courses, or seminars.
- (52) 73. The Soil Conservation Service helps farmers develop soil conservation plans for their farms. Have you developed such a plan for your farm and, if so, how much of the plan has been implemented? Fully implemented, partially implemented, or not implemented as of yet?
- Do not have a plan = 1 Partially implemented plan = 3  
 Fully implemented plan = 2 Not implemented as of yet = 4

Now, I would like to ask you some questions concerning your relationship to the community.

(53) (54) 74. What community do you consider yourself a member of? To be coded later

(55) 75. Do you have any relative living in this community ? Yes = 1 No = 2

(56) 76. Do you exchange work or machinery with anyone in this community?  
Yes = 1 No = 2

We are also interested in seeing how much agreement there is among members of your community concerning decision-making in the following issues.

(57) (58) 77. Would you please name three people in this community who you think are most important in influencing the decisions that are made concerning education? To be coded later

(59) (60)

(61) (62)

(63) (64) 78. Would you please name three people in your community who you think are most important in influencing the decisions that are made concerning local government? To be coded later

(65) (66)

(67) (68)

(69) (70) 79. Would you please name three people in your community who you think are most important in influencing decisions that are made concerning agri-  
culture? To be coded later

(71) (72)

(73) (74)

(75) (76) 80. Would you please name three people in your community who you think are most important in influencing the decisions that are made concerning soil conservation? To be coded later

(77) (78)

(79) (80)

\*\*\* END OF CARD FOURTEEN \*\*\*

(Respondent ID)

$\frac{1}{(1)}$   $\frac{1}{(2)}$   $\frac{1}{(3)}$   $\frac{1}{(4)}$   $\frac{1}{(5)}$   $\frac{5}{(6)}$

Turn to card #35

( 7) 81. Which of these sources of farm information have you found to be most important regarding soil conservation?

( 8) 82. Second most important

( 9) 83. Third most important

- (1) friends, neighbors and relatives
- (2) television, radio, newspapers and magazines
- (3) government agencies and programs, such as county agents, extension services and vocational-agricultural courses
- (4) farm organizations
- (5) farm supply dealers for feed, seed and impliments
- (6) others specify and code later

In what community do you usually purchase: to be coded later

|      |      | Item                                             | Location |
|------|------|--------------------------------------------------|----------|
| (10) | (11) | 84. Farm Machinery                               |          |
| (12) | (13) | 85. Feed                                         |          |
| (14) | (15) | 86. Seed                                         |          |
| (16) | (17) | 87. Fertilizer, Herbicides & Insecticides        |          |
| (18) | (19) | 88. Livestock and Poultry                        |          |
| (20) | (21) | 89. Gasoline, Diesel Fuel & Oil                  |          |
| (22) | (23) | 90. Lumber and Hardware                          |          |
| (24) | (25) | 91. Automobiles                                  |          |
| (26) | (27) | 92. Groceries                                    |          |
| (28) | (29) | 93. Clothing                                     |          |
| (30) | (31) | 94. Furniture and Appliances                     |          |
| (32) | (33) | 95. Legal and Tax Services                       |          |
| (34) | (35) | 96. Financial Services                           |          |
| (36) | (37) | 97. Recreation (dining or evening entertainment) |          |

Turn to card 36

(38) 98. To what extent do you believe your neighbors are using the soil conservation practices which are needed on their farms?

- (1) Not using any of the needed soil conservation practices
- (2) Using a few of the needed soil conservation practices
- (3) Using many of the needed soil conservation practices
- (4) Using all of the needed soil conservation practices

Turn to card 37

(39) 99. Which of these responses most closely represent how farmers in your community feel about using soil conservation practices?

- (1) Farmers feel they do not need to use any soil conservation practices
- (2) Farmers feel they should use some of the appropriate soil conservation practices
- (3) Farmers feel they should use most of the appropriate soil conservation practices
- (4) Farmers feel they should use all of the appropriate soil conservation practices



I am going to show you a card which lists various organizations.

Turn to card #38

Beginning with JOB RELATED organizations:

100. Do you belong to any organization such as these?

List all JOB RELATED organizations in table below

Repeat for RECREATION; FRATERNAL, POLITICAL, OR SERVICE; SCHOOL, EDUCATIONAL, OR YOUTH; FEDERAL, STATE, OR LOCAL COUNCILS, COMMITTEES, COMMISSIONS, OR BOARDS; LOCAL GOVERNMENT; and CHURCH RELATED.

Concerning organization named below, in what town does it usually meet?

101. About what percent of these meetings do you normally attend?

102. Have you ever been an officer or served on a committee or board of this organization?

Repeat questions #100, #101, and #102 for all listed organizations

To be coded later

| Name of Organization | Location | Percent<br>of Meetings<br>Attended | Yes = 1    No = 2 |           |
|----------------------|----------|------------------------------------|-------------------|-----------|
|                      |          |                                    | Officer           | Committee |
| (1)                  |          |                                    |                   |           |
| (40-43)              |          | (44)                               | (45)              | (46)      |
| (2)                  |          |                                    |                   |           |
| (47-50)              |          | (51)                               | (52)              | (53)      |
| (3)                  |          |                                    |                   |           |
| (54-57)              |          | (58)                               | (59)              | (60)      |
| (4)                  |          |                                    |                   |           |
| (61-64)              |          | (65)                               | (66)              | (67)      |
| (5)                  |          |                                    |                   |           |
| (68-71)              |          | (72)                               | (73)              | (74)      |

\*\*\* END OF CARD FIFTEEN \*\*\*

(Respondent ID)

|         | $\frac{1}{(1)}$ | $\frac{2}{(2)}$ | $\frac{3}{(3)}$ | $\frac{4}{(4)}$ | $\frac{5}{(5)}$ | $\frac{6}{(6)}$ |      |      |      |
|---------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------|------|------|
| (6)     |                 |                 |                 |                 |                 |                 |      |      |      |
| (7-10)  |                 |                 |                 |                 |                 |                 | (11) | (12) | (13) |
| (7)     |                 |                 |                 |                 |                 |                 |      |      |      |
| (14-17) |                 |                 |                 |                 |                 |                 | (18) | (19) | (20) |
| (8)     |                 |                 |                 |                 |                 |                 |      |      |      |
| (21-24) |                 |                 |                 |                 |                 |                 | (25) | (26) | (27) |
| (9)     |                 |                 |                 |                 |                 |                 |      |      |      |
| (28-31) |                 |                 |                 |                 |                 |                 | (32) | (33) | (34) |
| (10)    |                 |                 |                 |                 |                 |                 |      |      |      |
| (35-38) |                 |                 |                 |                 |                 |                 | (39) | (40) | (41) |

Turn to card #39

Now in this final section of the questionnaire I am going to read a number of statements. Please choose the response that best fits your feelings toward the statement:

Code as:

|                   |     |
|-------------------|-----|
| strongly disagree | = 1 |
| disagree          | = 2 |
| undecided         | = 3 |
| agree             | = 4 |
| strongly agree    | = 5 |

- (41) 103. Chemicals and pesticides used in farming can have harmful effects on our environment.
- (42) 104. In order to maintain the long-term productivity of the land, the government has the right to require land owners to practice soil conservation.
- (43) 105. Financial aid from the government is what makes soil conservation worth the effort.
- (44) 106. A field looks best with straight, clean rows.
- (45) 107. Agriculture is the most basic occupation in our society and almost all other occupations depend on it.
- (46) 108. Stewardship of the soil should be an important part of American agriculture.
- (47) 109. Protecting our water and soil is so important that continuing improvements must be made regardless of costs.
- (48) 110. I must be willing to take a number of risks to get ahead.
- (49) 111. Ten years from now we will be faced with a shortage of good land for producing food.
- (50) 112. Soil and water conservation practices have already cost more than they are worth and should be reduced.

- (51) 113. Agricultural life is the natural life for man.
- (52) 114. The government has helped my family conserve energy by encouraging efficient farming practices.
- (53) 115. Farmers need more information on how a soil conservation practice will affect their farming operation.
- (54) 116. The federal government should provide low-interest loans to farmers who want to get started in farming.
- (55) 117. The federal government should help pay for soil erosion control on farms.
- (56) 118. Stewardship of the soil is an important part of being a successful farmer.
- (57) 119. Moldboard plowing cannot be replaced by newer tillage systems.
- (58) 120. Even if his income has dropped to a low point, a farmer should try to stick it out so his children can grow up on a farm.
- (59) 121. There is excessive reliance by farmers on chemicals and pesticides to control pests and plant diseases.
- (60) 122. Practicing stewardship is important in my local farming community.
- (61) 123. The government should enforce soil loss limits.
- (62) 124. In farming, the successful man is the one who makes the most profit.
- (63) 125. The only real objective of farming is to make a profit.
- (64) 126. I am generally cautious about accepting new ideas.
- (65) 127. In deciding whether or not to try a new practice, a farmer's first consideration should be "is it profitable?"

|                   |     |
|-------------------|-----|
| strongly disagree | = 1 |
| disagree          | = 2 |
| undecided         | = 3 |
| agree             | = 4 |
| strongly agree    | = 5 |

- (66) 128. I regard myself as the kind of person who is willing to take a few more risks than others.
- (67) 129. I am reluctant about adopting new ways of doing things until I see them working for people around me.
- (68) 130. As a farmer, I have a moral obligation to preserve the land for the next generation.
- (69) 131. Farmers should have the responsibility for solving farm problems and the government should stay out of the picture.

|                   |     |
|-------------------|-----|
| strongly disagree | = 1 |
| disagree          | = 2 |
| undecided         | = 3 |
| agree             | = 4 |
| strongly agree    | = 5 |

Thank you very much for your cooperation with this survey.

- (70) Would you be interested in receiving a copy of the results?  
Yes = 1 No = 2

Finish Time: \_\_\_\_\_

(71) (72) (73) Duration: \_\_\_\_\_ (minutes)

(74) Interviewer: \_\_\_\_\_

Respondent Contact #2

Telephone Interview

July-August  
1980



ID. NO. \_\_\_\_\_

August 1980

Iowa State University  
College of Agriculture  
Experimental Station - Extension Service

Adoption of Soil Conservation Practices  
(Telephone Interview)

|                     |                    |       |       |
|---------------------|--------------------|-------|-------|
| Name _____          | Interviewer: _____ |       |       |
| Address _____       | Dates of calls:    | Date  | Time  |
| City _____          |                    | _____ | _____ |
| Telephone No. _____ |                    | _____ | _____ |
|                     |                    | _____ | _____ |
|                     | Starting time:     | _____ |       |

[INT: When speaking with the respondent:]

Hello, Mr/s. \_\_\_\_\_. This is \_\_\_\_\_ from the Statistical Laboratory at Iowa State University. One of our interviewers talked with you this last spring about some of the soil conservation practices you use on your farm. We want to thank you again for your cooperation at that time. Could I talk with you about some of the other aspects of your farming operation?

Purpose of project (if needed)

We want to find out why farmers adopt certain soil conservation practices, and what kinds of programs for controlling erosion farmers would prefer. This information will be useful to those people setting soil conservation policies and programs.

1979 ACREAGE

First, I'd like to ask about your operation last year.

1. a. How many acres did you own and operate in 1979? . . . . . \_\_\_\_\_
- b. How many acres did you rent from others and  
operate on a cash rent basis in 1979? . . . . . \_\_\_\_\_
- c. How many acres did you rent from others and  
operate on a crop share basis in 1979? . . . . . \_\_\_\_\_

[INT: Add a, b, and c] \_\_\_\_\_

That makes a total of \_\_\_\_\_ acres you operated in 1979.

Is that correct?

☐ Yes

☐ No —> Clarify with R

PRESENT (1980) ACREAGE

Now, we'd like to know about the acres you operate now, that is,  
this 1980 crop year.

2. a. How many acres do you own and operate this year? . . . . . \_\_\_\_\_
- b. How many acres are you renting from others and  
operating on a cash rent basis? . . . . . \_\_\_\_\_
- c. How many acres are you renting from others and  
operating on a crop share basis? . . . . . \_\_\_\_\_

[INT: Add a, b, and c] \_\_\_\_\_

That makes a total of \_\_\_\_\_ acres you are operating now.

Is that correct?

☐ Yes

☐ No —> Clarify with R

3. In 1979, how many acres did you own and rent out to others? \_\_\_\_\_

4. Presently, how many acres do you own and rent out to others? \_\_\_\_\_

5. Which of the following best describes how your present farming operation is organized?

(a) Is it ...

☐ ... a single family operation?

☐ ... a partnership? ———> Does the partnership include ...

☐ ... related individuals?

☐ ... nonrelated individuals?

☐ ... both?

☐ ... a corporation? ———> Is the corporation ...

☐ ... a single family corporation?

☐ ... a corporation consisting of more than one family?

☐ ... a corporation of unrelated individuals?

☐ ... or something else? (Specify) \_\_\_\_\_

(b) Did you have this same organization last year, that is, in 1979?

☐ Yes ———> Go to Q. 6.

☐ No

How was your farming operation organized in 1979? Was it ...

☐ ... a single family operation?

☐ ... a partnership? ———> Did the partnership include ...

☐ ... related individuals?

☐ ... nonrelated individuals?

☐ ... both?

☐ ... a corporation? ———> Was the corporation ...

☐ ... a single family corporation?

☐ ... a corporation consisting of more than one family?

☐ ... a corporation of unrelated individuals?

☐ ... or something else? (Specify) \_\_\_\_\_

6. Now I'd like to ask you about the labor that was used on your farm in 1979.

(a) How many members of your household, including yourself, worked on your farm during 1979? . . . . . \_\_\_\_\_

(b) During 1979, did anyone else do any work on this farm, including custom work?

☐ Yes

☐ No —> Skip to (g)

(c) Were any of these other workers employed on a regular basis, either full-time or part-time?

☐ Yes —> How many days of regular full-time labor did you hire in 1979? . . . . . \_\_\_\_\_  
How many days of regular part-time labor did you hire in 1979? . . . . . \_\_\_\_\_

☐ No

(d) During 1979, did you hire any occasional day labor?

☐ Yes —> About how many days of this occasional day labor did you hire? . . . . . \_\_\_\_\_

☐ No

(e) Did you hire any custom work done in 1979?

☐ Yes —> (1) What was this custom work? \_\_\_\_\_  
\_\_\_\_\_

(2) About how many days of custom work did you hire done? . . . . . \_\_\_\_\_

☐ No

(f) Considering all the labor you used in 1979, about what percent of this labor was provided by you and members of your household? . . . . . \_\_\_\_\_ %

(g) Thinking about this year, 1980, will the type and amount of labor used on your farm be about the same as last year?

☐ Yes

☐ No —> What changes will you make? \_\_\_\_\_  
\_\_\_\_\_

Can you tell me why you are making these changes? \_\_\_\_\_  
\_\_\_\_\_

7.

Refer to Q. 2:  
Does R operate any land that he owns?

☐ Yes

☐ No → Go to Q. 8

Who makes the major management decisions concerning the land you own and operate? Would you say ...

☐ ... you make the major management decisions?

☐ ... you and your spouse?

☐ ... you and some other person? (Specify) \_\_\_\_\_

8.

Refer to Q. 2:  
Does R operate any rented land?

☐ Yes → From how many landlords do you rent land? \_\_\_\_\_

☐ No → Go to Q. 9

(a) Would you please give me the names of each of these landlords?  
(Record responses in table below.)

(b) How many acres do you rent from (landlord) ?

(c) On the land you rent from (landlord), who makes the major decisions? Would you say ...

... you make the major management decisions?

... the landlord?

... you and the landlord?

... the farm manager?

... you and the farm manager? or

... you and some other person? (Specify)

|             | (a)              | (b)   | (c)                        |      |               |              |                       |                    |
|-------------|------------------|-------|----------------------------|------|---------------|--------------|-----------------------|--------------------|
|             |                  |       | Who makes major decisions? |      |               |              |                       |                    |
| L.L.<br>No. | Name of landlord | Acres | Op.                        | L.L. | Op. &<br>L.L. | Farm<br>mgr. | Op. &<br>farm<br>mgr. | Other<br>(specify) |
| 1           |                  |       |                            |      |               |              |                       |                    |
| 2           |                  |       |                            |      |               |              |                       |                    |
| 3           |                  |       |                            |      |               |              |                       |                    |
| 4           |                  |       |                            |      |               |              |                       |                    |



9. Next we would like to talk with you about the problem of soil erosion and its effect on water quality. Currently, the public policies used to control soil erosion are educational programs and providing financial assistance to farmers who use certain soil conservation practices. These programs are mostly voluntary, that is, an individual farmer may or may not choose to use particular practices which decrease soil erosion.

Some people feel that these voluntary policies are not working, and that mandatory policies should be used. I have a list of some mandatory policies that have been suggested. As I read a policy to you, would you tell me whether or not such a policy would have any effect on your future in farming? The first policy is: (read policy)

- (a) Would this policy have any effect on your future in farming?
- (b) (If "YES") What effect do you think it would have?
- (c) (If "maybe cause me to quit farming" not mentioned) ASK:  
Do you think this policy could possibly cause you to quit farming?

[INT: Go to next policy.]

|                                                                                                           | (a)         |    | (b)                   | (c)                                 |    |
|-----------------------------------------------------------------------------------------------------------|-------------|----|-----------------------|-------------------------------------|----|
| Policy                                                                                                    | Any effect? |    | (If YES) What effect? | Possibly cause you to quit farming? |    |
|                                                                                                           | Yes         | No |                       | Yes                                 | No |
| 1. To levy a tax on any farmer who exceeds a certain limit of soil loss on his land.                      |             |    |                       |                                     |    |
| 2. Any farmer who exceeds a certain limit of soil loss would not be eligible for parity payments.         |             |    |                       |                                     |    |
| 3. Any farmer who exceeds a certain limit of soil loss would not be eligible for low interest crop loans. |             |    |                       |                                     |    |
| 4. To prohibit fall plowing with a moldboard plow, with fines imposed on violators.                       |             |    |                       |                                     |    |
| 5. To impose a fine on any farmer who exceeds a certain limit of soil loss on his land.                   |             |    |                       |                                     |    |

10. Finally, could you tell me in which township and section you live?

Township: \_\_\_\_\_

Section: \_\_\_\_\_

We would like to get some more ideas from you about soil conservation, but I won't take any more of your time now. We may briefly visit with you again sometime this winter when you are not so busy. Thank you for your cooperation.

Ending time \_\_\_\_\_

Attitude of respondent:

Friendly \_\_\_\_\_

Indifferent \_\_\_\_\_

Belligerent \_\_\_\_\_

Respondent Contact #3

Personal Interview

March 1981

IOWA STATE UNIVERSITY

of Science and Technology

AMES, IOWA 50011

College of Agriculture  
Experiment Station—Extension Service



ADOPTION OF SOIL CONSERVATION PRACTICES IN IOWA

Hello! I'm \_\_\_\_\_ from the Agricultural Experiment Station in Ames. As I mentioned to you on the telephone, I need to talk with you for just a few minutes to get some information on the specific tillage practices that you use on your fields, plus some additional information on the use of soil conservation practices. This information will be added to information you have given us previously on problems, needs and opinions on soil conservation. With this total package of information we hope we can help agricultural policy makers in developing soil conservation programs that are both effective and acceptable to farmers.

As before, your participation is completely voluntary, and you may refuse to answer any questions you feel are too personal, or stop the interview at any time. However, please keep in mind that the success of the study depends on the accuracy and completeness of the information we obtain from you and your neighbors.

The information you give will be kept confidential and you will remain anonymous. All information will be for statistical analysis only.

If you have any questions now or during the interview I will be happy to answer them. Again, we appreciate your cooperation.

|                     |       |
|---------------------|-------|
| Respondent ID#:     | _____ |
| Interviewer's Name: | _____ |
| Start Time:         | _____ |
| Date:               | _____ |
| Appointment:        | _____ |
| Call back: 1st      | _____ |
| 2nd                 | _____ |
| 3rd                 | _____ |

I would like to begin by getting some general information on the land you operate in this area. We would like to do this on a field by field basis using these ASCS crop year photos and some aerial photos taken last year.

Let's begin by identifying and numbering all the fields you farm. Here is a photo in which your farmstead is located, are any of these adjacent fields in your operation?

(NUMBER AND ESTABLISH BOUNDARIES)

According to this county map, in what other sections are you farming?  
(POINT OUT SECTION IN WHICH FARMSTEAD IS LOCATED)

|               |               |
|---------------|---------------|
| Section _____ | Section _____ |
| Section _____ | Section _____ |
| Section _____ | Section _____ |

(CONTINUED TO NUMBER AND ESTABLISH BOUNDARIES FOR ALL FIELDS)

Now let's begin with field number 1.

(RECORD RESPONSES ON TILLAGE SHEETS)

1. What is the current crop rotation on this field?

C = Corn; B = Beans; M = Meadow; G = Oats, Small Grains

1a. What crop was grown on this field last year?

(CIRCLE CROP ABBREV. IN Q1)

2. Do you own (O), cash rent (CR), or crop share (CS) on this field?

3. Are there any terraces (T), stripcropping (S), or contour planting (CP) on this field?

4. According to this card, what pieces of equipment did you use on this field in the Fall of 1980? What will you be using this spring?

5. What was the average (CORN or SOYBEAN) yield on this field last year?

(REPEAT QUESTIONS 1 - 5 FOR ALL FIELDS)

Now several questions about conservation tillage, which is also called minimum tillage, reduced tillage, and lowa tillage.

(SKIP TO Q11 WHEN QUESTIONS ARE NO LONGER APPLICABLE) .



6. Where or from who did you first hear about minimum tillage?
- \_\_\_\_\_
- \_\_\_\_\_
7. Approximately when (year) did this occur? \_\_\_\_\_
- \_\_\_\_\_
8. After you first heard about minimum tillage, where did you get further information that helped you evaluate the practice before you actually tried it?
- \_\_\_\_\_
- \_\_\_\_\_
9. Approximately how long after you had first heard about minimum tillage did you seek out this additional information?
- \_\_\_\_\_
10. When you decided to try minimum tillage for the first time, where did you get the additional information on how to actually use it?
- \_\_\_\_\_
- \_\_\_\_\_
11. After you began regular use of minimum tillage, did you get help from someone to make sure that you were getting along alright? (IF YES) Who?
- \_\_\_\_\_
- \_\_\_\_\_
12. In your opinion, what is the most knowledgeable source of information about soil conservation available to you?
- \_\_\_\_\_
- \_\_\_\_\_
13. In you opinion, what is the most trustworthy source of information about soil conservation available to you?
- \_\_\_\_\_
- \_\_\_\_\_

14. In your opinion, what is the most useful source of soil conservation information available to you?
- \_\_\_\_\_
- \_\_\_\_\_
15. In general terms, how would you recognize a soil erosion problem on your farm?
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
16. What do you feel would be the main causes of this soil erosion problem?
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
17. What would be the most practical solution to this problem?
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
18. Finally, approximately how many tons per acre of soil loss occurs on your farm each year?
- \_\_\_\_\_

Now several questions about your day-to-day operations.

19. Do you keep a record or notebook to write down daily details of your farming operation? (CIRCLE ANSWER)
- Yes      No
20. Do you usually plan each day's work ahead of time?
- Yes      No
21. Are you usually able to get your work done on time?
- Yes      No

22. Do you subscribe to any market information services such as Doanes Agricultural Reports, Pro Farmer, or Farmer's Grain and Livestock? (IF YES) Which ones are these? (LIST)
- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_
23. Do you utilize a futures commodity broker when marketing your grain or livestock? (CIRCLE ANSWER)
- Yes      No
24. How close, in inches, do you plant your corn? \_\_\_\_\_
- 23a. When did you first begin to plant your corn in \_\_\_\_\_ inch rows? (RECORD YEAR) \_\_\_\_\_
25. How close, in inches, do you plant your soybeans? \_\_\_\_\_
- 25a. When did you first begin to plant your soybeans in \_\_\_\_\_ inch rows? (RECORD YEAR) \_\_\_\_\_
26. Which, if any, of these activities have you done during the past year?
- a. Attended a meeting at which the County Extension Director presented information?
- Yes      No      (IF YES) How many times? \_\_\_\_\_
- b. Attended a meeting at which State or Area Extension Specialists presented information?
- Yes      No      (IF YES) How many times? \_\_\_\_\_
- c. Received a bulletin or other publication from the County Extension Office?
- Yes      No      (IF YES) How many times? \_\_\_\_\_
- d. Visited or talked with a member of the County Extension Staff?
- Yes      No      (IF YES) How many times? \_\_\_\_\_

e. Visited or talked with a member of the  
Soil Conservation Service?

Yes      No      (IF YES) How many times? \_\_\_\_\_

f. Visited or talked with a member of the  
ASCS (Agricultural Stabilization and  
Conservation Service)?

Yes      No      (IF YES) How many times? \_\_\_\_\_

g. Visited or talked with your local  
Soil Conservation District Commissioners?

Yes      No      (IF YES) How many times? \_\_\_\_\_

27. During the past year did you attend any short courses, clinics, or  
agricultural conferences sponsored by the Extension Service or a  
commercial firm?

Yes      No      (IF YES, ASK 27a)

27a. Were any of these related to soil conservation?

Yes      No

28. Did you attend any field days, field demonstrations, or test plots  
during the past year?

Yes      No      (IF YES, ASK 28a AND 28b)

28a. How many? \_\_\_\_\_

28b. Were any of these related to soil conservation?

Yes      No

There are a few more things we would like to know about your farm  
operation and use of soil conservation practices. However, I don't want  
to take any more of your time.

I will leave the remainder of the questionnaire with you. You can  
fill it out at your convenience over the next few days and return it to  
us in the pre-stamped envelope that is attached.

Again, please remember all the information you give use will be kept  
in complete confidence. You will never be identified with any of the  
information you give us.

Respondent Contact #4

Mail Questionnaire

March 1981



IOWA STATE UNIVERSITY  
of Science and Technology  
AMES, IOWA 50011

College of Agriculture  
Experiment Station Extension Service

515-294-8320

RESPONDENT ID # \_\_\_\_\_



## ADOPTION OF SOIL CONSERVATION PRACTICES IN IOWA

I wish to thank you for taking the time to answer these questions. We are asking these questions because your views are important. Again, the information you give will be kept confidential and you will remain anonymous. All this information will be used for statistical analysis only.

After you have answered all the questions to the best of your ability, please indicate whether you wish to receive future reports from this study. Then place this questionnaire in the envelope we have provided and mail it at your convenience.

We certainly appreciate your cooperation and interest in this project.

Professors Nowak and Korsching

\*\*\*\*\*

We frequently hear how soil erosion is a serious problem in Iowa. However, what we don't hear are the reasons why farmers have been unable to deal with this problem. We would like to know what you think are some of the reasons why this erosion problem still persists. For each of the statements listed below, please indicate how important you think it is in explaining why the problem still persists.

### IMPORTANCE OF REASON

|                                                                                                                            | (CIRCLE THE NUMBER OF YOUR ANSWER) |           |             |                     |
|----------------------------------------------------------------------------------------------------------------------------|------------------------------------|-----------|-------------|---------------------|
|                                                                                                                            | Very<br>Important                  | Important | Unimportant | Very<br>Unimportant |
| A. Many farmers don't agree with the soil conservation people that erosion is a particularly serious problem               | 1                                  | 2         | 3           | 4                   |
| B. Effective erosion control measures are too expensive for most farmers                                                   | 1                                  | 2         | 3           | 4                   |
| C. Many tenant farmers can't reach a fair arrangement with their landlord for sharing the cost of erosion control measures | 1                                  | 2         | 3           | 4                   |

## CONTINUED

## IMPORTANCE OF REASON

|                                                                                                                                                                                           | (CIRCLE THE NUMBER OF YOUR ANSWER) |           |             |                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-----------|-------------|---------------------|
|                                                                                                                                                                                           | Very<br>Important                  | Important | Unimportant | Very<br>Unimportant |
| D. Many farmers reject recommended erosion control practices because they don't think they are effective in controlling erosion                                                           | 1                                  | 2         | 3           | 4                   |
| E. Many farmers are unwilling to borrow money needed to install erosion control practices                                                                                                 | 1                                  | 2         | 3           | 4                   |
| F. Many farmers reject erosion control measures because they don't want to change their accustomed ways of farming                                                                        | 1                                  | 2         | 3           | 4                   |
| G. Many farmers figure soil erosion isn't hurting them so why worry about it                                                                                                              | 1                                  | 2         | 3           | 4                   |
| H. Many farmers just don't know very much about erosion control. They assume it will cost a lot of money and don't bother learning any more about it                                      | 1                                  | 2         | 3           | 4                   |
| I. Many farmers dislike erosion control practices because they are a nuisance to employ on the farm                                                                                       | 1                                  | 2         | 3           | 4                   |
| J. Many farmers just don't have the necessary managerial skills to successfully use the newer reduced tillage systems                                                                     | 1                                  | 2         | 3           | 4                   |
| K. Many farmers believe that agricultural scientists will find a solution (better plants and fertilizers) to the erosion problem, and therefore they really don't have to worry about it. | 1                                  | 2         | 3           | 4                   |

Please examine the following statements to determine which one best represents your own views. There are no right or wrong answers, only opinions.

PLEASE CHECK (✓) ONE OF THE FOLLOWING STATEMENTS

- ☐ I do not believe that I have a moral obligation to maintain soil and water resources.
- ☐ I believe that I have a moral obligation to maintain soil and water resources even if it costs me \$500 a year.
- ☐ I believe that I have a moral obligation to maintain soil and water resources even if it costs me \$2500 a year.
- ☐ I believe that I have a moral obligation to maintain soil and water resources even if it costs me \$4500 a year.
- ☐ I believe that I have a moral obligation to maintain soil and water resources regardless of the costs.

\*\*\*\*\*

Please examine the following statements to determine which one best represents your own views. There are no right or wrong answers, only opinions.

PLEASE CHECK (✓) ONE OF THE FOLLOWING STATEMENTS

- ☐ Even though I hold a legal claim to this land, I realize there is no such thing as absolute ownership when it comes to soil and water resources.
- ☐ The land I own is mine and I can treat it anyway I want as long as I do not interfere with my neighbors.
- ☐ Ownership of the land is a relative matter, and I will be held accountable to a higher authority for any misuse or abuse of these resources.
- ☐ The land I own is mine and I should not have to answer to anyone on how I use it.
- ☐ Even though I own this land, I have to take into consideration the rights of my neighbors and fellow citizens in how I use it.

\*\*\*\*\*

Please examine the following statements to determine which one best represents your own views. There are no right or wrong answers, only opinions.

PLEASE CHECK (✓) ONE OF THE FOLLOWING STATEMENTS

- ☐ I believe that I have an obligation to maintain the land for future generations as long as it does not interfere with my ability to generate a profit.
- ☐ Nurturing and maintaining the land for future generations is one of the major goals in my farm operation.
- ☐ I have only one consideration in farming, and that is to make a profit regardless of any long term consequences to the land and future generations.
- ☐ I believe that it is important to find a balance between making a good living at farming and still maintaining the land for future generations.
- ☐ Profitability isn't everything, it is also important that I nurture the land for future generations so that I pass it on in a better condition than I obtained it.

One purpose of this study is to find out the kinds of problems farmers face in their farming operations. I would like you to examine this list of items that some farmers have mentioned as problems, and ask whether you see each of these as not a problem you face, a slight problem, a moderate problem, or a serious problem about which you wish something could be done.

| (CIRCLE THE NUMBER OF YOUR ANSWER)                               |                  |                     |                     |                    |
|------------------------------------------------------------------|------------------|---------------------|---------------------|--------------------|
|                                                                  | Not a<br>Problem | A Slight<br>Problem | Moderate<br>Problem | Serious<br>Problem |
| A. Finding and keeping good hired workers                        | 1                | 2                   | 3                   | 4                  |
| B. Being able to adequately control weeds in my crops            | 1                | 2                   | 3                   | 4                  |
| C. Damage to my land from soil erosion                           | 1                | 2                   | 3                   | 4                  |
| D. Variations in the prices I am likely to get for my crops      | 1                | 2                   | 3                   | 4                  |
| E. Knowing how to match herbicide use to minimum tillage systems | 1                | 2                   | 3                   | 4                  |
| F. Availability of cost-sharing funds for cost-sharing programs  | 1                | 2                   | 3                   | 4                  |
| G. Knowing when to apply herbicides for best results             | 1                | 2                   | 3                   | 4                  |
| H. Knowing how to control soil erosion                           | 1                | 2                   | 3                   | 4                  |
| I. Being able to control soil erosion                            | 1                | 2                   | 3                   | 4                  |
| J. Breakdown of farm machinery                                   | 1                | 2                   | 3                   | 4                  |
| K. Knowing the amount of herbicide to apply                      | 1                | 2                   | 3                   | 4                  |
| L. Loss of fertilizer through erosion                            | 1                | 2                   | 3                   | 4                  |
| M. Damage to crops from insects or rodents                       | 1                | 2                   | 3                   | 4                  |

## CONTINUED

(CIRCLE THE NUMBER OF YOUR ANSWER)

|                                                                                                      | Not a<br>Problem | A Slight<br>Problem | Moderate<br>Problem | Serious<br>Problem |
|------------------------------------------------------------------------------------------------------|------------------|---------------------|---------------------|--------------------|
| N. A lack of topsoil on<br>hilltops and ridges                                                       | 1                | 2                   | 3                   | 4                  |
| O. Knowing when to apply<br>fertilizer for best<br>results                                           | 1                | 2                   | 3                   | 4                  |
| P. The amount of my effort<br>necessary to obtain<br>assistance for conservation<br>programs         | 1                | 2                   | 3                   | 4                  |
| Q. The size or shape of the<br>fields I farm                                                         | 1                | 2                   | 3                   | 4                  |
| R. Ability to get the kind<br>and amount of credit I<br>need                                         | 1                | 2                   | 3                   | 4                  |
| S. The percentage of cost<br>sharing currently<br>available for conserva-<br>tion structures         | 1                | 2                   | 3                   | 4                  |
| T. Knowing how to match<br>fertilizer use with minimum<br>tillage systems                            | 1                | 2                   | 3                   | 4                  |
| U. Whether farm supplies<br>(fertilizers, fuels,<br>chemicals) will be<br>available when I need them | 1                | 2                   | 3                   | 4                  |
| V. Poor water quality in<br>neighboring creeks and<br>rivers                                         | 1                | 2                   | 3                   | 4                  |
| W. Knowing which kind of<br>herbicide to apply                                                       | 1                | 2                   | 3                   | 4                  |
| X. Knowing the landlord's<br>expectations about my<br>farm operations                                | 1                | 2                   | 3                   | 4                  |
| Y. Getting accurate information<br>on controlling soil erosion                                       | 1                | 2                   | 3                   | 4                  |
| Z. The price of good farm land<br>in my neighborhood                                                 | 1                | 2                   | 3                   | 4                  |

Landowners appear to be involved in varying degrees in the day to day operations of their land. In some cases the landowners are deeply involved in farm operations; in other cases the farm operators make most decisions. We would like to know whether the farmer or the landlord usually makes the decisions listed below. If you are only an owner-operator, please skip to the next question.

WHO USUALLY DECIDES

(CIRCLE THE NUMBER OF YOUR ANSWER)

|                                                                                     | Farmer<br>Decides | Farmer<br>Primarily<br>Decides | We<br>Decide<br>Together | Landlord<br>Primarily<br>Decides | Landlord<br>Decides |
|-------------------------------------------------------------------------------------|-------------------|--------------------------------|--------------------------|----------------------------------|---------------------|
| A. What crops will be grown                                                         | 1                 | 2                              | 3                        | 4                                | 5                   |
| B. When crops will be planted                                                       | 1                 | 2                              | 3                        | 4                                | 5                   |
| C. What tillage practices are to be used                                            | 1                 | 2                              | 3                        | 4                                | 5                   |
| D. The kinds and amounts of fertilizer to be used                                   | 1                 | 2                              | 3                        | 4                                | 5                   |
| E. How the fertilizer will be applied                                               | 1                 | 2                              | 3                        | 4                                | 5                   |
| F. The kind of conservation practices to be used                                    | 1                 | 2                              | 3                        | 4                                | 5                   |
| G. The kind of crop rotations used                                                  | 1                 | 2                              | 3                        | 4                                | 5                   |
| H. Whether there will be involvement in state or federal soil conservation programs | 1                 | 2                              | 3                        | 4                                | 5                   |
| I. When crops will be sold                                                          | 1                 | 2                              | 3                        | 4                                | 5                   |
| J. Use and maintenance of on-farm grain storage facilities                          | 1                 | 2                              | 3                        | 4                                | 5                   |



A number of factors can be taken into consideration before deciding which crops to grow next year. In general, which of the following factors do you take into consideration before making a decision on next year's crops?

(CHECK ALL THAT APPLY)

- ☐ Machinery availability
- ☐ Labor availability or the time required to carry out necessary operations
- ☐ Input costs such as those associated with seed, fertilizer, and fuel
- ☐ Futures commodity prices
- ☐ Soil erosion problems
- ☐ Grain needs for livestock
- ☐ Storage facilities
- ☐ Performance of last year's crops
- ☐ Soil moisture
- ☐ Soil test results
- ☐ Other (Please specify) \_\_\_\_\_

How do you keep your farm records?

(CHECK ALL THAT APPLY)

- ☐ Keep sales tickets, but no other ledger summaries or bookkeeping.
- ☐ Keep my own ledger system.
- ☐ Keep my own ledger using extension's farm record book or a similar commercial system.
- ☐ Keep a ledger system with summaries for tax purposes only.
- ☐ Keep a ledger with quarterly or more frequent summaries.
- ☐ Use a commercial mail-in record system.
- ☐ Use a local bookkeeper for tax purposes only.
- ☐ Use my own on-farm mini computer or dial-up service.
- ☐ Other system (Please specify) \_\_\_\_\_

Please examine this list of farm machinery and implements and check (✓) those items that you own, borrow, or rent/hire.

|                                            | OWN | BORROW | RENT/HIRE |
|--------------------------------------------|-----|--------|-----------|
| a. Chisel Plow-straight shanks             |     |        |           |
| b. Chisel Plow-twisted shanks              |     |        |           |
| c. Chisel Plow-wing covers                 |     |        |           |
| d. Offset Disk                             |     |        |           |
| e. Tandem Disk                             |     |        |           |
| f. Field Cultivator                        |     |        |           |
| g. Harrow                                  |     |        |           |
| h. Rotary Tiller                           |     |        |           |
| i. Moldboard Plow                          |     |        |           |
| j. Conventional Planter                    |     |        |           |
| k. Rotary Strip Till<br>or Buffalo Planter |     |        |           |
| l. Grain Drill                             |     |        |           |

TRACTORS

SIZE IN HORSEPOWER

AGE

1.

2.

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Do you wish to receive copies of any future reports based on this study?

Yes      No

APPENDIX B.

Professional Papers, Publications, Theses and  
Dissertations Resulting from Research

#### PROFESSIONAL PAPERS AND PUBLICATIONS

- Korsching, Peter F., Curtis W. Stofferahn, Peter J. Nowak, and Donald Wagener,  
1981 "A comparison of adopters of conservation practices with traditional innovation adopter categories." Paper presented at the 1981 Annual Meeting of the Rural Sociological Society, Guelph, Canada.
- Korsching, Peter F. and Peter J. Nowak,  
1980 "Environmental Criteria and Farm Structure: Flexibility in Conservation Policy." Paper presented at Symposium on Farm Structure and Rural Policy, Ames, Iowa.
- Korsching, Peter F. and Peter J. Nowak,  
1983 "Environmental Criteria and Farm Structure: Flexibility in Conservation Policy," in I. Garth Youngberg (ed.), Farms in Transition: pp. 149-159 Interdisciplinary Perspectives on Farm Structure. Ames: Iowa State University Press.
- Korsching, Peter F. and Peter J. Nowak,  
1982 "Farmer acceptance of alternative conservation policies." Agriculture and Environment, 7, January, 1982, pp. 1-14.
- Korsching, Peter F. and Peter J. Nowak,  
1982 "Potential contributions of sociologists to water resources research." Paper presented at the "Water Resources Research in the North Central Region: Problems and Potentials for Agriculture" symposium, Illinois Beach State Park, Illinois.
- Nowak, Peter J.  
1982 "Impacts of technology on cropland and rangeland productivity: managerial capacity of farmers."
- Nowak, Peter J. and Peter F. Korsching,  
1979 "Preventive Innovation: Problems in the Adoption of Agricultural Conservation Practices." Paper presented at the 1979 Annual Meeting of the Rural Sociological Society, Burlington, Vermont.
- Nowak, Peter J. and Peter F. Korsching,  
"Social and Institutional factors affecting the adoption and maintenance of agricultural BMPs," in F. Schaller and G. Bailey (eds.), Agricultural Management and Water Quality. Ames: Iowa State University Press (forthcoming).

Nowak, Peter J. and D.J. Wagener

- 1982 "Risk and social position in explaining the adoption of soil conservation practices: an application of Cancian's thesis. In L.A. Christensen and J.A. Miranowski (eds.), Perceptions, Attitudes and Risk: Overlooked Variables in Formulating Public Policy on Soil Conservation and Water Quality. Washington, D.C.: ERS Staff Report No AGES820129.

Nowak, P.J., D.J. Wagener, R.E. Rickson, and R. Thompson

- 1980 "Stewardship and environmental concern." Paper presented at the annual meeting of the RSS, Ithaca, NY.

Stofferahn, Curtis W. and Peter F. Korsching,

- 1980 Communication, Diffusion and Adoption of Innovations: A Bibliographical Update. Monticello, Illinois: Vance Bibliographies.

Stofferahn, Curtis W. and Donald J. Wagener

- 1982 "Community norms and the adoption of soil conservation practices." Paper presented at the annual meeting of the Rural Sociological Society, San Francisco, CA.

Wagener, Donald J., Peter J. Nowak, Peter F. Korsching and Curtis W. Stofferahn

- 1981 "Cancian's 'upper middle class conservation' thesis: an application to noncommercial agricultural innovations." Paper presented at the 1981 Annual Meeting of the Rural Sociological Society, Guelph, Canada.

## THESES AND DISSERTATIONS

Hass, Jannette J.

- 1983 The Effect of Community Attachment on Purchase Location of Goods and Services Among Farmers. M.S. thesis, Department of Sociology and Anthropology, Iowa State University, Ames.

Moon, Nuriyah

- 1982 Perceived Characteristics of the Innovation and Characteristics of the Audience in Influencing the Adoption of Soil Conservation Practices: A Test of the Traditional Model. M.S. thesis, Department of Sociology and Anthropology, Iowa State University, Ames.

Rulifson, Suzanne

- 1983 A Farming Systems Research and Development Approach to the Adoption of Soil Conservation Technologies. M.S. thesis, Department of Sociology and Anthropology, Iowa State University, Ames.

Stofferahn, Curtis W.

- 1981 Voluntary Association Participation and the Adoption of Innovations. M.S. thesis, Department of Sociology and Anthropology, Iowa State University, Ames.

Wagener, Donald J.

- 1984 Social Rank and the Adoption of Soil Conservation Innovations. Ph.D. dissertation, Department of Sociology and Anthropology, Iowa State University, Ames.